

PRINCIPLES OF PHILOSOPHY^P

CHAPTER 1

LESSONS FROM THE HISTORY OF PHILOSOPHY

§1. NOMINALISM*

15. Very early in my studies of logic, before I had really been devoting myself to it more than four or five years, it became quite manifest to me that this science was in a bad condition, entirely unworthy of the general state of intellectual development of our age, and in consequence of this, every other branch of philosophy except ethics — for it was already clear that psychology was a special science and no part of philosophy — was in a similar disgraceful state. About that time — say the date of Mansel's *Prolegomena Logica*† — Logic touched bottom. There was no room for it to become more degraded. It had been sinking steadily, and relatively to the advance of physical science, by no means slowly from the time of the revival of learning — say from the date of the last fall of Constantinople ‡. One important addition to the subject had been made early in the eighteenth century, the Doctrine of Chances. But this had not come from the professed logicians, who knew nothing about it. Whewell, it is true, had been doing some fine work, but it was not of a fundamental character. De Morgan and Boole had laid the foundations for modern exact logic, but they can hardly be said to have begun the erection of the edifice itself. Under these circumstances, I naturally opened the dusty folios of the scholastic doctors. Thought generally was, of course, in a somewhat low condition under the Plantagenets. You can appraise it very well by the impression that Dante, Chaucer, Marco Polo, Froissart, and the great cathedrals make upon us. But [their] logic, relatively to the general condition of

* From the "Lowell Lectures of 1903," Lecture IIIa.

† 1851

‡ 1453.

thought, was marvellously exact and critical. They can tell us nothing concerning methods of reasoning since their own reasoning was puerile, but their analyses of thought and their discussions of all those questions of logic that almost trench upon metaphysics are very instructive as well as very good discipline in that subtle kind of thinking that is required in logic.

16. In the days of which I am speaking, the age of Robert of Lincoln, Roger Bacon, St Thomas Aquinas, and Duns Scotus, the question of nominalism and realism was regarded as definitively and conclusively settled in favor of realism. You know what the question was. It was whether *laws* and general *types* are figments of the mind or are real. If this be understood to mean whether there really are any laws and types, it is strictly speaking a question of metaphysics and not of logic. But as a first step toward its solution, it is proper to ask whether, granting that our common-sense beliefs are true, the analysis of the meaning of those beliefs shows that, according to those beliefs, laws and types are objective or subjective. This is a question of logic rather than of metaphysics — and as soon as this is answered the reply to the other question immediately follows after.

17. Notwithstanding a great outburst of nominalism in the fourteenth century which was connected with politics, the nominalists being generally opposed to the excessive powers of the pope and in favor of civil government, a connection that lent to the philosophical doctrine a factitious following, the Scotists, who were realists, were in most places the predominant party, and retained possession of the universities. At the revival of learning they stubbornly opposed the new studies; and thus the word *Duns*, the proper name of their master, came to mean an adversary of learning. The word originally further implied that the person so called was a master of subtle thought with which the humanists were unable to cope. But in another generation the disputations by which that power of thought was kept in training had lost their liveliness, and the consequence was that Scotism died out when the strong Scotists died. It was a mere change of fashion.

18. The humanists were weak thinkers. Some of them no doubt might have been trained to be strong thinkers, but they had no severe training in thought. 'All their energies went to

writing a classical language and an artistic style of expression. They went to the ancients for their philosophy, and mostly took up the three easiest of the ancient sects of philosophy, Epicureanism, Stoicism, and Scepticism. Epicureanism was a doctrine extremely like that of John Stuart Mill. The Epicureans alone of the later ancient schools believed in inductive reasoning, which they grounded upon the uniformity of nature, although they made the uniformity of nature to consist in somewhat different characters from those Stuart Mill emphasizes. Like Mill, the Epicureans were extreme nominalists. The Stoics advocated the flattest materialism, which nobody any longer has any need of doing since the new invention of Monism enables a man to be perfectly materialist in substance, and as idealistic as he likes in words. Of course the Stoics could not but be nominalists. They took no stock in inductive reasoning. They held it to be a transparent fallacy. The Sceptics of the *Renaissance* were something like the agnostics of the generation now passing away, except that they went much further. Our agnostics contented themselves with declaring everything beyond ordinary generalizations of experience to be unknowable, while the Sceptics did not think any scientific knowledge of any description to be possible. If you turn over the pages, for example, of Cornelius Agrippa's book *De [incertitudine et] vanitate scientiarum [et artium]* [1531], you will find he takes up every science in succession, arithmetic, geometry, mechanics, optics, and after examination pronounces each to be altogether beyond the power of the human mind. Of course, therefore, as far as they believed in anything at all, the Sceptics were nominalists.

19. In short, there was a tidal wave of nominalism. Descartes was a nominalist. Locke and all his following, Berkeley, Hartley, Hume, and even Reid, were nominalists. Leibniz was an extreme nominalist, and Rémusat [C. F. M.?] who has lately made an attempt to repair the edifice of Leibnizian monadology, does so by cutting away every part which leans at all toward realism. Kant was a nominalist, although his philosophy would have been rendered compacter, more consistent, and stronger if its author had taken up realism, as he certainly would have done if he had read Scotus. Hegel was a nominalist of realistic yearnings. I might continue the list

much further. Thus, in one word, all modern philosophy of every sect has been nominalistic.

20. In a long notice of Frazer's *Berkeley*, in the *North American Review* for October, 1871,* I declared for realism. I have since very carefully and thoroughly revised my philosophical opinions more than half a dozen times, and have modified them more or less on most topics, but I have never been able to think differently on that question of nominalism and realism. In that paper I acknowledged that the tendency of science has been toward nominalism; but the late Dr. Francis Ellingwood Abbot in the very remarkable introduction to his book entitled "Scientific Theism" [1885], showed on the contrary, quite conclusively, that science has always been at heart realistic, and always must be so, and upon comparing his writings with mine, it is easily seen that these features of nominalism which I pointed out in science are merely superficial and transient.

21. The heart of the dispute lies in this. The modern philosophers — one and all, unless Schelling be an exception — recognize but one mode of being, the being of an individual thing or fact, the being which consists in the object's crowding out a place for itself in the universe, so to speak, and reacting by brute force of fact, against all other things. I call that existence.

22. Aristotle, on the other hand, whose system, like all the greatest systems, was evolutionary, recognized besides an embryonic kind of being, like the being of a tree in its seed, or like the being of a future contingent event, depending on how a man shall decide to act. In a few passages Aristotle seems to have a dim *aperçue* of a third mode of being in the *entelechy*. The embryonic being for Aristotle was the being he called matter, which is alike in all things, and which in the course of its development took on form. Form is an element having a different mode of being. The whole philosophy of the scholastic doctors is an attempt to mould this doctrine of Aristotle into harmony with christian truth. This harmony the different doctors attempted to bring about in different ways. But all the realists agree in reversing the order of Aristotle's evolution by making the form come first, and the individuation of that

* See vol. 9.

form come later. Thus, they too recognized two modes of being; but they were not the two modes of being of Aristotle.

23. My view is that there are three modes of being. I hold that we can directly observe them in elements of whatever is at any time before the mind in any way. They are the being of positive qualitative possibility, the being of actual fact, and the being of law that will govern facts in the future.

24. Let us begin with considering actuality, and try to make out just what it consists in. If I ask you what the actuality of an event consists in, you will tell me that it consists in its happening *then* and *there*. The specifications *then* and *there* involve all its relations to other existents. The actuality of the event seems to lie in its relations to the universe of existents. A court may issue *injunctiōns* and *judgments* against me and I not care a snap of my finger for them. I may think them idle vapor. But when I feel the sheriff's hand on my shoulder, I shall begin to have a sense of actuality. Actuality is something *brute*. There is no reason in it. I instance putting your shoulder against a door and trying to force it open against an unseen, silent, and unknown resistance. We have a two-sided consciousness of effort and resistance, which seems to me to come tolerably near to a pure sense of actuality. On the whole, I think we have here a mode of being of one thing which consists in how a second object is. I call that Secondness.

25. Besides this, there are two modes of being that I call Firstness and Thirddness. Firstness is the mode of being which consists in its subject's being positively such as it is regardless of aught else. That can only be a possibility. For as long as things do not act upon one another there is no sense or meaning in saying that they have any being, unless it be that they are such in themselves that they may perhaps come into relation with others. The mode of being a *redness*, before anything in the universe was yet red, was nevertheless a positive qualitative possibility. And redness in itself, even if it be embodied, is something positive and *sui generis*. That I call Firstness. We naturally attribute Firstness to outward objects, that is we suppose they have capacities in themselves which may or may not be already actualized, which may or may not ever be actualized, although we can know nothing of such possibilities [except] so far as they are actualized.

26. Now for Thirdness. Five minutes of our waking life will hardly pass without our making some kind of prediction; and in the majority of cases these predictions are fulfilled in the event. Yet a prediction is essentially of a general nature, and cannot ever be completely fulfilled. To say that a prediction has a decided tendency to be fulfilled, is to say that the future events are in a measure really governed by a law. If a pair of dice turns up sixes five times running, that is a mere uniformity. The dice might happen fortuitously to turn up sixes a thousand times running. But that would not afford the slightest security for a prediction that they would turn up sixes the next time. If the prediction has a tendency to be fulfilled, it must be that future events have a tendency to conform to a general rule. "Oh," but say the nominalists "this general rule is nothing but a mere word or couple of words." I reply, "Nobody ever dreamed of denying that what is general is of the nature of a general sign: but the question is whether future events will conform to it or not. If they will, your adjective 'mere' seems to be ill-placed." A rule to which future events have a tendency to conform is *ipso facto* an important thing, an important element in the happening of those events. This mode of being which *consists*, mind my word if you please, the mode of being which *consists* in the fact that future facts of Secondness will take on a determinate general character, I call a Thirdness.

§2. CONCEPTUALISM*

27. Many philosophers call their variety of nominalism, "conceptualism": but it is essentially the same thing and their not seeing that it is so is but another example of that loose and slapdash style of thinking that has made it possible for them to remain nominalists. Their calling their "conceptualism" a middle term between realism and nominalism is itself an example in the very matter to which nominalism relates. For while the question between nominalism and realism is in its nature, susceptible of but two answers: yes and no, they make an idle and irrelevant point which had been thoroughly considered by all the great realists, and instead of

* From "Essays on Meaning," June, 1919.

drawing a valid distinction, as they suppose, only repeat the very same confusion of thought which made them nominalists. The question was whether all properties, laws of nature, and predicates of more than an actually existent subject are, without exception, mere figments or not.¹ The conceptualists seek to wedge in a third position conflicting with the principle of excluded middle. They say, "Those universals are real, indeed, but they are only real thoughts." So much may be said of the philosopher's stone. To give that answer constitutes a man a nominalist. Are the laws of nature, and that property of gold by which it will yield the purple of Cassius, no more real than the philosopher's stone? No, the conceptualists admit that there is a difference, but they say that the laws of nature and the properties of chemical species are results of thinking. The great realists had brought out all the truth there is in that much more distinctly long before modern conceptualism appeared in the world. They showed that the general is not capable of full actualization in the world of action and reaction but is of the nature of what is thought, but that our thinking only apprehends and does not create thought, and that that thought may and does as much govern outward things as it does our thinking. But those realists did not fall into any confusion between the real fact of having a dream and the illusory object dreamed. The conceptualist doctrine is an undisputed truism about *thinking*, while the question between nominalists and realists relates to *thoughts*, that is, to the objects which thinking enables us to know.

¹ It must not be imagined that any notable realist of the thirteenth or fourteenth century took the ground that any "universal" was what we in English should call a "thing," as it seems that, in an earlier age, some realists and some nominalists, too, had done, though perhaps it is not quite certain that they did so, their writings being lost. Their very definition of a "universal" admits that it is of the same generic nature as a word, namely, is "*Quod natum optum est prædicari de pluribus*" Neither was it their doctrine that any "universal" *itself* is real. They might, indeed, some of them, think so, but their realism did not consist in *that* opinion, but in holding that what the word *signifies*, in contradistinction to what it can be truly said of, is real. Anybody may happen to opine that "the" is a real English word, but that will not constitute him a realist. But if he thinks that, whether the word "hard" itself be real or not, the property, the character, the predicate, *hardness*, is not invented by men, as the word is, but is really and truly in the hard things and is one in them all, as a description of habit, disposition, or behavior, *then* he is a realist.

§3. THE SPIRIT OF SCHOLASTICISM*

28. . . [The] history of logic is not altogether without an interest as a branch of history. For so far as the logic of an age adequately represents the methods of thought of that age, its history is a history of the human mind in its most essential relation — that is to say with reference to its power of investigating truth. But the chief value of the study of historical philosophy is that it disciplines the mind to regard philosophy with a cold and scientific eye and not with passion as though philosophers were contestants.

29. British logic is a subject of some particular interest inasmuch as some peculiar lines of thought have always been predominant in those islands, giving their logicians a certain family resemblance, which already begins to appear in very early times. The most striking characteristic of British thinkers is their nominalistic tendency. This has always been and is now very marked. So much so that in England and in England alone are there many thinkers more distinguished at this day as being nominalistic than as holding any other doctrines. William Ockham or Oakum, an Englishman, was beyond question the greatest nominalist that ever lived; while Duns Scotus, another British name, it is equally certain is the subtlest advocate of the opposite opinion. These two men, Duns Scotus and William Ockham, are decidedly the greatest speculative minds of the middle ages, as well as two of the profoundest metaphysicians that ever lived. Another circumstance which makes [the] logic of the British Islands interesting is that there more than elsewhere have the studies of the logic of the natural sciences been made. Already we find some evidences of English thought running in that direction, when we meet with that singular phenomenon Roger Bacon — a man who was scientific before science began. At the first dawn of the age [of] science, Francis Bacon wrote that professedly and really logical

itise, the *Novum Organum*, a work the celebrity of which perhaps exceeds its real merits. In our own day, the writings of Whewell, Mill, and Herschel afford some of the finest accounts of the methods of thought in science. Another direction in which logical thought has gone farther in England than

* From Lecture I, "Early Nominalism and Realism" of the "Lectures on British Logicians," delivered at Harvard in 1869.

elsewhere is in mathematico-formal logic — the chief writers on which are Boole, DeMorgan, and the Scotch Sir William Hamilton — for although Hamilton was so bitter against mathematics, that his own doctrine of the quantified predicate is essentially mathematical is beyond intelligent dispute. This fondness for the formal part of logic had already appeared in the middle ages, when the nominalistic school of Ockham — the most extremely scholastic of the scholastics — and next to them the school of Scotus carried to the utmost the doctrines of the *Parva Logica* which were the contribution of those ages to this branch of the science. And those *Parva Logica* may themselves have had an English origin, for the earliest known writer upon the subject — unless the Synopsis *Ἀριστοτελούς Ὀργάνου* be attributed to Psellus — was an Englishman, William Shirwood . *

30. The most striking characteristic of medieval thought is the importance attributed to authority. It was held that authority and reason were two coordinate methods of arriving at truth, and far from holding that authority was secondary to reason, the scholastics were much more apt to place it quite above reason. When Berengarius in his dispute with Lanfranc remarked that the whole of an affirmation does not stand after a part is subverted, his adversary replied "The sacred authorities being relinquished, you take refuge in dialectic, and when I am to hear and to answer concerning the ministry of the Faith, I prefer to hear and to answer the sacred authorities which are supposed to relate to the subject rather than dialectical reasons." To this Berengarius replied that St. Augustine in his book *De doctrina christiana* says that what he said concerning an affirmation is bound up indissolubly with that very eternity of truth which is God. But added "Maximi plane cordis est, per omnia ad dialecticum confugere, quia confugere ad eam ad rationem est confugere, quo qui non confugit, cum secundum rationem sit factus ad imaginem Dei, suum honorem relinquit, nec potest renovari de die in diem ad imaginem Dei."† Next to sacred authorities — the Bible, the church and the fathers — that of Aristotle of course ranked the highest. It could be denied, but the presumption was immense against his being wrong on any particular point.

* Cf. Prantl's *Geschichte der Logik*, 2 Aufl. Bd. 2, S. 266, Bd. 3, S. 10ff.

† Ibid., vol. 2, p. 72

31. Such a weight being attached to authority — a weight which would be excessive were not the human mind at that time in so uneducated a state that it could not do better than follow masters, since it was totally incompetent to solve metaphysical problems for itself — it follows naturally that originality of thought was not greatly admired, but that on the contrary the admirable mind was his who succeeded in interpreting consistently the dicta of Aristotle, Porphyry, and Boethius. Vanity, therefore, the vanity of cleverness, was a vice from which the schoolmen were remarkably free. They were minute and thorough in their knowledge of such authorities as they had, and they were equally minute and thorough in their treatment of every question which came up.

32. All these characters remind us less of the philosophers of our day than of the men of science. I do not hesitate to say that scientific men now think much more of authority than do metaphysicians, for in science a question is not regarded as settled or its solution as certain until all intelligent and informed doubt has ceased and all competent persons have come to a catholic agreement, whereas fifty metaphysicians, each holding opinions that no one of the other forty-nine can admit, will nevertheless generally regard their fifty opposite opinions as more certain than that the sun will rise tomorrow. This is to have what seems an absurd disregard for others' opinions. The man of science attaches positive value to the opinion of every man as competent as himself, so that he cannot but have a doubt of a conclusion which he would adopt were it not that a competent man opposes it, but on the other hand, he will regard a sufficient divergence from the convictions of the great body of scientific men as tending of itself to argue incompetence, and he will generally attach little weight to the opinions of men who have long been dead and were ignorant of much that has been since discovered which bears upon the question in hand. The schoolmen, however, attached the greatest authority to men long since dead, and there they were right, for in the dark ages it was not true that the later state of human knowledge was the most perfect, but on the contrary. I think it may be said then that the schoolmen did not attach too much weight to authority, although they attached much more to it than we ought to do or than ought or could be

attached to it in any age in which science is pursuing a successful and onward course — and of course infinitely more than is attached to it by those intellectual nomads, the modern metaphysicians, including the positivists.

33 In the slight importance they attached to a brilliant theory, the schoolmen also resembled modern scientific men, who cannot be comprehended in this respect at all by men not scientific. The followers of Herbert Spencer, for example, cannot comprehend why scientific men place Darwin so infinitely above Spencer, since the theories of the latter are so much grander and more comprehensive. They cannot understand that it is not the sublimity of Darwin's theories which makes him admired by men of science, but that it is rather his minute, systematic, extensive, strict, scientific researches which have given his theories a more favorable reception — theories which in themselves would barely command scientific respect. And this misunderstanding belongs to all those metaphysicians who fancy themselves men of science on account of their metaphysics. This same scientific spirit has been equally misunderstood as it is found in the schoolmen. They have been above all things found fault with because they do not write a literary style and do not "study in a literary spirit." The men who make this objection cannot possibly comprehend the real merits of modern science. If the words *quidditas*, *entitas*, and *haec-certas* are to excite our disgust, what shall we say of the Latin of the botanists, and the style of any technically scientific work? As for that phrase "studying in a literary spirit" it is impossible to express how nauseating it is to any scientific man, yes even to the scientific linguist. But above all things it is the searching thoroughness of the schoolmen which affiliates them with men of science and separates them, world-wide, from modern so-called philosophers. The thoroughness I allude to consists in this, that in adopting any theory, they go about everywhere, they devote their whole energies and lives in putting it to tests *bona fide* — not such as shall merely add a new spangle to the glitter of their proofs but such as shall really go toward satisfying their restless insatiable impulse to put their opinions to the test. Having a theory, they must apply it to every subject and to every branch of every subject to see whether it produces a result in accordance with the only cri-

teria they were able to apply—the truth of the Catholic faith and the teaching of the Prince of Philosophers.

34. Mr. George Henry Lewes in his work on Aristotle* seems to me to have come pretty near to stating the true cause of the success of modern science when he has said that it was *verification*. I should express it in this way: modern students of science have been successful because they have spent their lives not in their libraries and museums but in their laboratories and in the field; and while in their laboratories and in the field they have been not gazing on nature with a vacant eye, that is, in passive perception unassisted by thought, but have been *observing*—that is, perceiving by the aid of analysis—and testing suggestions of theories. The cause of their success has been that the motive which has carried them to the laboratory and the field has been a craving to know how things really were, and an interest in finding out whether or not general propositions actually held good—which has overbalanced all prejudice, all vanity, and all passion. Now it is plainly not an essential part of this method in general that the tests were made by the observation of natural objects. For the immense progress which modern mathematics has made is also to be explained by the same intense interest in testing general propositions by particular cases—only the tests were applied by means of particular demonstrations. This is observation, still, for as the great mathematician Gauss has declared—algebra is a science of the eye,† only it is observation of artificial objects and of a highly recondite character. Now this same unwearied interest in testing general propositions is what produced those long rows of folios of the schoolmen, and if the test which they employed is of only limited validity so that they could not unhampered go on indefinitely to further discoveries, yet the *spirit*, which is the most essential thing—the *motive*, was nearly the same. And how different this spirit is from that of the major part, though not all, of modern philosophers—even of those who have called themselves empirical, no man who is actuated by it can fail to perceive.

* *Aristotle A Chapter from the History of Science*, London (1864)

† Quoted by Sylvester in his Presidential Address to the British Assn in 1863
See Sylvester's *Mathematical Papers*, vol 2, p 654

§4. KANT AND HIS REFUTATION OF IDEALISM*

35. Kant's whole philosophy turns upon his logic. He gives the name of logic to the greater part of his *Critic of the Pure Reason*, and it is a result of the great fault of his logical theory that he does not extend that name to the whole work. This greatest fault was at the same [time] the greatest merit of his doctrine: it lay in his sharp discrimination of the intuitive and the discursive processes of the mind. The distinction itself is not only familiar to everybody but it had long played a part in philosophy. Nevertheless, it is on such obvious distinctions that the greater systems have been founded, and [Kant] saw far more clearly than any predecessor had done the whole philosophical import of this distinction. This was what emancipated him from Leibnizianism, and at the same time turned him against sensationalism. It was also what enabled him to see that no general description of existence is possible, which is perhaps the most valuable proposition that the *Critic* contains. But he drew too hard a line between the operations of observation and of ratiocination. He allows himself to fall into the habit of thinking that the latter only begins after the former is complete; and wholly fails to see that even the simplest syllogistic conclusion can only be drawn by observing the relations of the terms in the premisses and conclusion. His doctrine of the *schemata* can only have been an afterthought, an addition to his system after it was substantially complete. For if the *schemata* had been considered early enough, they would have overgrown his whole work.

36. Kant's refutation of idealism in the second edition of the *Critic of the Pure Reason* has been often held to be inconsistent with his main position or even to be knowingly sophistical. It appears to me to be one of the numerous passages in that work which betray an elaborated and vigorous analysis, marred in the exposition by the attempt to state the argument more abstractly and demonstratively than the thought would warrant.

In "Note 1," Kant says that his argument beats idealism

* 35 is an unpublished, uncompleted review of T. K. Abbott's translation of Kant's *Introduction to Logic*, etc. Longmans Green & Co., 1885. 37-38 is "Notes on the Question of the Existence of an External World" c. 1890. 36 and 39 are from fragmentary alternative mss. of that same date.

at its own game. How is that? The idealist says that all that we know immediately, that is, otherwise than inferentially, is what is *present* in the mind, and things out of the mind are not so present. The whole idealist position turns upon this conception of the *present*.

37. The idealistic argument turns upon the assumption that certain things are absolutely "present," namely what we have in mind at the moment, and that nothing else can be immediately, that is, otherwise than inferentially known. When this is once granted, the idealist has no difficulty in showing that that external existence which we cannot know immediately we cannot know, at all. Some of the arguments used for this purpose are of little value, because they only go to show that our knowledge of an external world is fallible; now there is a world of difference between fallible knowledge and no knowledge. However, I think it would have to be admitted as a matter of logic that if we have no immediate perception of a non-ego, we can have no reason to admit the supposition of an existence so contrary to all experience as that would in that case be.

38. But what evidence is there that we can immediately know only what is "present" to the mind? The idealists generally treat this as self-evident; but, as Clifford jestingly says, "it is evident" is a phrase which only means "we do not know how to prove." The proposition that we can immediately perceive only what is present seems to me parallel to that other vulgar prejudice that "a thing cannot act where it is not." An opinion which can only defend itself by such a sounding phrase is pretty sure to be wrong. That a thing cannot act where it is not is plainly an induction from ordinary experience, which shows no forces except such as act through the resistance of materials, with the exception of gravity which, owing to its being the same for all bodies, does not appear in ordinary experience like a force. But further experience shows that attractions and repulsions are the universal types of forces. A thing may be said to be wherever it acts; but the notion that a particle is absolutely present in one part of space and absolutely absent from all the rest of space is devoid of all foundation. In like manner, the idea that we can immediately perceive only what is present seems to be founded on our ordinary experi-

ence that we cannot recall and reexamine the events of yesterday nor know otherwise than by inference what is to happen tomorrow. Obviously, then, the first move toward beating idealism at its own game is to remark that we apprehend our own ideas only as flowing in time, and since neither the future nor the past, however near they may be, is *present*, there is as much difficulty in conceiving our perception of what passes within us as in conceiving external perception. If so, replies the idealist, instead of giving up idealism we must go still further to nihilism. Kant does not notice this retort, but it is clear from his footnote that he would have said Not so, for it is impossible we should so much as think we think in time unless we do think in time, or rather, dismissing blind impossibility, the mere imagination of time is a clear perception of the past. Hamilton* stupidly objects to Reid's phrase "immediate memory", but an immediate, intuitive consciousness of time clearly exists wherever time exists. But once grant immediate knowledge in time, and what becomes of the idealist theory that we immediately know only the *present*? For the present can contain no time.

39. But Kant does not pursue this line of thought along the straight road to its natural result, because he is a sort of idealist himself. Namely, though not idealistic as to the substance of things, he is partially so in regard to their accidents. Accordingly, he introduces his distinction of the variable and the persistent (*beharrlich*), and seeks to show that the only way we can apprehend our own flow of ideas, binding them together as a connected flow, is by attaching them to an immediately perceived persistent externality. He refuses to inquire how that immediate external consciousness is possible, though such an inquiry might have probed the foundations of his system.

§5. HEGELISM†

40 The critical logicians have been much affiliated to the theological seminaries. About the thinking that goes on in laboratories they have known nothing. Now the seminarists

* Sir William Hamilton's *Discussions on Philosophy and Literature*, ch. 2, p. 55. What Hamilton objects to is "immediate knowledge of the past" as a definition of memory.

† 40 and 41-2 are from separate unidentified fragments, c. 1892.

and religionists generally have at all times and places set their faces against the idea of continuous growth. That disposition of intellect is the most catholic element of religion. Religious truth having been once defined is never to be altered in the most minute particular; and theology being held as queen of the sciences, the religionists have bitterly fought by fire and tortures all great advances in the true sciences; and if there be no true continuous growth in men's ideas where else in the world should it be looked for? Thence, we find this folk setting up hard lines of demarcation, or great gulfs, contrary to all observation, between good men and bad, between the wise and foolish, between the spirit and the flesh, between all the different kinds of objects, between one quantity and the next. So shut up are they in this conception of the world that when the seminarist Hegel discovered that the universe is everywhere permeated with continuous growth (for that, and nothing else, is the "Secret of Hegel") it was supposed to be an entirely new idea, a century and a half after the differential calculus had been in working order.

41. Hegel, while regarding scientific men with disdain, has for his chief topic the importance of continuity, which was the very idea the mathematicians and physicists had been chiefly engaged in following out for three centuries. This made Hegel's work less correct and excellent in itself than it might have been; and at the same time hid its true mode of affinity with the scientific thought into which the life of the race had been chiefly laid up. It was a misfortune for Hegelism, a misfortune for "philosophy," and a misfortune (in lesser degree) for science.

42. My philosophy resuscitates Hegel, though in a strange costume.

CHAPTER 2

LESSONS FROM THE HISTORY OF SCIENCE*

§1. THE SCIENTIFIC ATTITUDE

43. If we endeavor to form our conceptions upon history and life, we remark three classes of men. The first consists of those for whom the chief thing is the qualities of feelings. These men create art. The second consists of the practical men, who carry on the business of the world. They respect nothing but power, and respect power only so far as it [is] exercised. The third class consists of men to whom nothing seems great but reason. If force interests them, it is not in its exertion, but in that it has a reason and a law. For men of the first class, nature is a picture, for men of the second class, it is an opportunity, for men of the third class, it is a cosmos, so admirable, that to penetrate to its ways seems to them the only thing that makes life worth living. These are the men whom we see possessed by a passion to learn, just as other men have a passion to teach and to disseminate their influence. If they do not give themselves over completely to their passion to learn, it is because they exercise self-control. Those are the natural scientific men, and they are the only men that have any real success in scientific research.

44 If we are to define science, not in the sense of stuffing it into an artificial pigeon-hole where it may be found again by some insignificant mark, but in the sense of characterizing it as a living historic entity, we must conceive it as that about which such men as I have described busy themselves. As such, it does not consist so much in *knowing*, nor even in "organized knowledge," as it does in diligent inquiry into truth for truth's sake, without any sort of axe to grind, nor for the sake of the delight of contemplating it, but from an impulse to penetrate into the reason of things. This is the sense in which

* A manuscript of notes for a projected, but never completed, *History of Science*, c. 1896

this book is entitled a History of *Science*. Science and philosophy seem to have been changed in their cradles. For it is not knowing, but the love of learning, that characterizes the scientific man; while the "philosopher" is a man with a system which he thinks embodies all that is best worth knowing. If a man burns to learn and sets himself to comparing his ideas with experimental results in order that he may correct those ideas, every scientific man will recognize him as a brother, no matter how small his knowledge may be

45. But if a man occupies himself with investigating the truth of some question for some ulterior purpose, such as to make money, or to amend his life, or to benefit his fellows, he may be ever so much better than a scientific man, if you will — to discuss that would be aside from the question — but he is not a scientific man. For example, there are numbers of chemists who occupy themselves exclusively with the study of dyestuffs. They discover facts that are useful to scientific chemistry; but they do not rank as genuine scientific men. The genuine scientific chemist cares just as much to learn about erbium — the extreme rarity of which renders it commercially unimportant — as he does about iron. He is more eager to learn about erbium if the knowledge of it would do more to complete his conception of the Periodic Law, which expresses the mutual relations of the elements.

§2. THE SCIENTIFIC IMAGINATION

46. When a man desires ardently to know the truth, his first effort will be to imagine what that truth can be. He cannot prosecute his pursuit long without finding that imagination unbridled is sure to carry him off the track. Yet nevertheless, it remains true that there is, after all, nothing but imagination that can ever supply him an inkling of the truth. He can stare stupidly at phenomena; but in the absence of imagination they will not connect themselves together in any rational way. Just as for Peter Bell a cowslip was nothing but a cowslip, so for thousands of men a falling apple was nothing but a falling apple; and to compare it to the moon would by them be deemed "fanciful."

47. It is not too much to say that next after the passion to

learn there is no quality so indispensable to the successful prosecution of science as imagination. Find me a people whose early medicine is not mixed up with magic and incantations, and I will find you a people devoid of all scientific ability. There is no magic in the medical Papyrus Ebers. The stolid Egyptian saw nothing in disease but derangement of the affected organ. There never was any true Egyptian science.

48. There are, no doubt, kinds of imagination of no value in science, mere artistic imagination, mere dreaming of opportunities for gain. The scientific imagination dreams of explanations and laws.

§3. SCIENCE AND MORALITY

49. A scientific man must be single-minded and sincere with himself. Otherwise, his love of truth will melt away, at once. He can, therefore, hardly be otherwise than an honest, fair-minded man. True, a few naturalists have been accused of purloining specimens, and some men have been far from judicial in advocating their theories. Both of these faults must be exceedingly deleterious to their scientific ability. But on the whole, scientific men have been the best of men. It is quite natural, therefore, that a young man who might develop into a scientific man should be a well-conducted person.

50. Yet in more ways than one an exaggerated regard for morality is unfavorable to scientific progress. I shall present only one of those ways. It will no doubt shock some persons that I should speak of morality as involving an element which can become bad. To them good conduct and moral conduct are one and the same — and they will accuse me of hostility to morality. I regard morality as highly necessary, but it is a means to good life, not necessarily coextensive with good conduct. Morality consists in the folklore of right conduct. A man is brought up to think he ought to behave in certain ways. If he behaves otherwise, he is uncomfortable. His conscience pricks him. That system of morals is the traditional wisdom of ages of experience. If a man cuts loose from it, he will become the victim of his passions. It is not safe for him even to reason about it, except in a purely speculative way. Hence, morality is essentially conservative. Good morals and good manners are identical, except that tradition

attaches less importance to the latter. The gentleman is imbued with conservatism. This conservatism is a habit, and it is the law of habit that it tends to spread and extend itself over more and more of the life. In this way, conservatism about morals leads to conservatism about manners and finally conservatism about opinions of a speculative kind. Besides, to distinguish between speculative and practical opinions is the mark of the most cultivated intellects. Go down below this level and you come across reformers and rationalists at every turn — people who propose to remodel the ten commandments on modern science. Hence it is that morality leads to a conservatism which any new view, or even any free inquiry, no matter how purely speculative, shocks. The whole moral weight of such a community will be cast against science. To inquire into nature is for a Turk very unbecoming to a good Moslem, just as the family of Tycho Brahe regarded his pursuit of astronomy as unbecoming to a nobleman. (See Thomas Nash in *Pierce Pennilesse* for the character of a Danish nobleman.)

51. This tendency is necessarily greatly exaggerated in a country when the "gentleman," or recognized exponent of good manners, is appointed to that place as the most learned man. For then the inquiring spirit cannot say the gentlemen are a lot of ignorant fools. To the moral weight cast against progress in science is added the weight of superior learning. Wherever there is a large class of academic professors who are provided with good incomes and looked up to as gentlemen, scientific inquiry must languish. Wherever the bureaucrats are the more learned class, the case will be still worse.

§4. MATHEMATICS

52. The first questions which men ask about the universe are naturally the most general and abstract ones. Nor is it true, as has so often been asserted, that these are the most difficult questions to answer. Francis Bacon is largely responsible for this error, he having represented — having nothing but his imagination and no acquaintance with actual science to draw upon — that the most general inductions must be reached by successive steps. History does not at all bear out

that theory. The errors about very general questions have been due to a circumstance which I proceed to set forth.

53. The most abstract of all the sciences is mathematics. That this is so, has been made manifest in our day, because all mathematicians now see clearly that mathematics is only busied about *purely hypothetical questions*. As for what the truth of existence may be the mathematician does not (*qua* mathematician) care a straw. It is true that early mathematicians could not clearly see that this was so. But for all their not seeing it, it was just as true of the mathematics of early days as of our own. The early mathematician might perhaps be more inclined to assert roundly that two straight lines in a plane cut by a third so as to make the sum of the internal angles on one side less than two right angles would meet at some finite distance on that side if sufficiently produced, although, as a matter of fact, we observe no such tendency in Euclid. But however that may have been, the early mathematician had certainly no more tendency than the modern to *inquire into the truth of that postulate*, but quite the reverse. What he really did, therefore, was merely to deduce consequences of unsupported assumptions, whether he recognized that this was the nature of his business or not. Mathematics, then, really was, for him as for us, the most abstract of the sciences, cut off from all inquiry into existential truth. Consequently, the tendency to attack the most abstract problems first, not because they were *recognized* as such, but because such they *were*, led to mathematics being the earliest field of inquiry.

54. We find some peoples drawn more toward arithmetic; others more toward geometry. But in either case, a correct method of reasoning was sure to be reached before many centuries of real inquiry had elapsed. The reasoning would be at first awkward, and one case would be needlessly split up into several. But still all influences were pressing the reasoner to make use of a diagram, and as soon as he did that he was pursuing the correct method. For mathematical reasoning consists in constructing a diagram according to a general precept, in observing certain relations between parts of that diagram not explicitly required by the precept, showing that these relations will hold for all such diagrams, and in formulating this conclusion in general terms. All valid necessary reasoning is in

fact thus diagrammatic.* This, however, is far from being obviously true. There was nothing to draw the attention of the early reasoners to the need of a diagram in such reasoning. Finding that by their inward meditations they could deduce the truth concerning, for example, the height of an inaccessible pillar, they naturally concluded the same method could be applied to positive inquiries.

In this way, early success in mathematics would naturally lead to bad methods in the positive sciences, and especially in metaphysics.

§5. SCIENCE AS A GUIDE TO CONDUCT

55. We have seen how success in mathematics would necessarily create a confidence altogether unfounded in man's power of eliciting truth by inward meditation without any aid from experience. Both its confidence in what is within and the absolute certainty of its conclusions lead to the confusion of a *priori* reason with conscience. For conscience, also, refuses to submit its dicta to experiment, and makes an absolute dual distinction between right and wrong. One result of this is that men begin to rationalize about questions of purity and integrity, which in the long run, through moral decay, is unfavorable to science. But what is worse, from our point of view, they begin to look upon science as a guide to conduct, that is, no longer as pure science but as an instrument for a practical end. One result of this is that all probable reasoning is despised. If a proposition is to be applied to action, it has to be embraced, or believed without reservation. There is no room for doubt, which can only paralyze action. But the scientific spirit requires a man to be at all times ready to dump his whole cart-load of beliefs, the moment experience is against them. The desire to learn forbids him to be perfectly cocksure that he knows already. Besides positive science can only rest on experience, and experience can never result in absolute certainty, exactitude, necessity, or universality. But it is precisely with the universal and necessary, that is, with Law, that [con]science concerns itself. Thus the real character of science is destroyed as soon as it is made an adjunct to conduct; and especially all progress in the inductive sciences is brought to a standstill.

* See 66, 240, 369 and vol 4, bk II

§6. MORALITY AND SHAM REASONING

56. The effect of mixing speculative inquiry with questions of conduct results finally in a sort of half make-believe reasoning which deceives itself in regard to its real character. Conscience really belongs to the subconscious man, to that part of the soul which is hardly distinct in different individuals, a sort of community-consciousness, or public spirit, not absolutely one and the same in different citizens, and yet not by any means independent in them. Conscience has been created by experience just as any knowledge is; but it is modified by further experience only with secular* slowness.

57. When men begin to rationalize about their conduct, the first effect is to deliver them over to their passions and produce the most frightful demoralization, especially in sexual matters. Thus, among the Greeks, it brought about pæderasty and a precedence of public women over private wives. But ultimately the subconscious part of the soul, being stronger, regains its predominance and insists on setting matters right. Men, then, continue to tell themselves they regulate their conduct by reason, but they learn to look forward and see what conclusions a given method will lead to before they give their adhesion to it. In short, it is no longer the reasoning which determines what the conclusion shall be, but it is the conclusion which determines what the reasoning shall be. This is sham reasoning. In short, as morality supposes self-control, men learn that they must not surrender themselves unreservedly to any method, without considering to what conclusions it will lead them. But this is utterly contrary to the single-mindedness that is requisite in science. In order that science may be successful, its votaries must hasten to surrender themselves at discretion to experimental inquiry, in advance of knowing what its decisions may be. There must be no reservations.

58. The effect of this shamming is that men come to look upon reasoning as mainly decorative, or at most, as a secondary aid in minor matters — a view not altogether unjust, if questions of conduct are alone to interest us. They, therefore, demand that it shall be plain and facile. If, in special cases, complicated reasoning is indispensable, they hire a specialist to perform it. The result of this state of things is, of course, a rapid

* On this use of "secular" see 176

deterioration of intellectual vigor, very perceptible from one generation to the next. This is just what is taking place among us before our eyes, and to judge from the history of Constantinople, it is likely to go on until the race comes to a despicable end.

§7. THE METHOD OF AUTHORITY

59 When society is broken into bands, now warring, now allied, now for a time subordinated one to another, man loses his conceptions of truth and of reason. If he sees one man assert what another denies, he will, if he is concerned, choose his side and set to work by all means in his power to silence his adversaries. The truth for him is that for which he fights.

60. The next step which is to be expected in a logical development not interrupted by accidental occurrences will consist in the recognition that a central authority ought to determine the beliefs of the entire community. As far as morals and religion go, this plan admirably fulfills its purpose of producing uniformity. But in order that it may do this, it is desirable that there should be another less absolute authority which shall declare, not infallibly but yet with a weight of collective learning, the propositions which science from time to time puts out of reasonable doubt, and which shall aid the researches of competent investigators. The value of such services in the development of science is immense, though they are accompanied by very serious disadvantages in not allowing to unofficial studies the weight which ought to be accorded to them. The history of science is full of examples of this sort.

§8. SCIENCE AND CONTINUITY

61. One of the worst effects of the influence of moral and religious reasonings upon science lies in this, that the distinctions upon which both insist as fundamental are dual distinctions, and that their tendency is toward an ignoring of all distinctions that are not dual and especially of the conception of continuity. Religion recognizes the saints and the damned. It will not readily admit any third fate. Morality insists that a motive is either good or bad. That the gulf between them is

bridged over and that most motives are somewhere near the middle of the bridge, is quite contrary to the teachings of any moral system which ever lived in the hearts and consciences of a people.

62. It is not necessary to read far in almost any work of philosophy written by a man whose training is that of a theologian, in order to see how helpless such minds are in attempting to deal with continuity. Now continuity, it is not too much to say, is the leading conception of science. The complexity of the conception of continuity is so great as to render it important wherever it occurs. Now it enters into every fundamental and exact law of physics or of psychics that is known. The few laws of chemistry which do not involve continuity seem for the most part to be very roughly true. It seems not unlikely that if the veritable laws were known continuity would be found to be involved in them.*

§9. THE ANALYTIC METHOD

63. The first problems to suggest themselves to the inquirer into nature are far too complex and difficult for any early solution, even if any satisfactorily secure conclusion can ever be drawn concerning them. What ought to be done, therefore, and what in fact is done, is at first to substitute for those problems others much simpler, much more abstract, of which there is a good prospect of finding probable solutions. Then, the reasonably certain solutions of these last problems will throw a light more or less clear upon more concrete problems which are in certain respects more interesting.

64. This method of procedure is that Analytic Method to which modern physics owes all its triumphs. It has been applied with great success in psychical sciences also. (Thus, the classical political economists, especially Ricardo, pursued this method.)† It is reprobated by the whole Hegelian army, who think it ought to be replaced by the "Historic Method," which studies complex problems in all their complexity, but which cannot boast any distinguished successes.

* See vol 6, bk I

† Cf 4 115

§10. KINDS OF REASONING*

65 There are in science three fundamentally different kinds of reasoning, Deduction (called by Aristotle *συμπαγωγή* or *αναγωγή*), Induction (Aristotle's and Plato's *ἐπαγωγή*) and Retrodution (Aristotle's *ἀπαγωγή*, but misunderstood because of corrupt text, and as misunderstood usually translated *abduction*).† Besides these three, Analogy (Aristotle's *ἀναλογία*) combines the characters of Induction and Retrodution.

66 *Deduction* is that mode of reasoning which examines the state of things asserted in the premisses, forms a diagram of that state of things, perceives in the parts of that diagram relations not explicitly mentioned in the premisses, satisfies itself by mental experiments upon the diagram that these relations would always subsist, or at least would do so in a certain proportion of cases, and concludes their necessary, or probable, truth. For example, let the premiss be that there are four marked points upon a line which has neither extremity nor furcation. Then, by means of a diagram,



we may conclude that there are two pairs of points such that in passing along the line in any way from one to the other point of either pair, one point of the second pair will be passed an odd number of times and the other point an even (or zero) number of times. This is *deduction*.

67. *Induction* is that mode of reasoning which adopts a conclusion as approximate, because it results from a method of inference which must generally lead to the truth in the long run. For example, a ship enters port laden with coffee. I go aboard and sample the coffee. Perhaps I do not examine over a hundred beans, but they have been taken from the middle, top, and bottom of bags in every part of the hold. I conclude by *induction* that the whole cargo has approximately the same value per bean as the hundred beans of my sample. All that induction can do is to ascertain the value of a ratio.

* Cf. vol 2, bk. III

† Peirce usually calls it abduction, sometimes hypothesis.

68. *Retroduction* is the provisional adoption of a hypothesis, because every possible consequence of it is capable of experimental verification, so that the persevering application of the same method may be expected to reveal its disagreement with facts, if it does so disagree. For example, all the operations of chemistry fail to decompose hydrogen, lithium, glucinum, boron, carbon, nitrogen, oxygen, fluorine, sodium, . . . gold, mercury, thallium, lead, bismuth, thorium, and uranium. We provisionally suppose these bodies to be simple, for if not, similar experimentation will detect their compound nature, if it can be detected at all. That I term *retroduction*.

69. *Analogy* is the inference that a not very large collection of objects which agree in various respects may very likely agree in another respect. For instance, the earth and Mars agree in so many respects that it seems not unlikely they may agree in being inhabited.

70. The methods of reasoning of science have been studied in various ways and with results which disagree in important particulars. The followers of Laplace treat the subject from the point of view of the theory of probabilities. After corrections due to Boole* and others,† that method yields substantially the results stated above. Whewell‡ described the reasoning just as it appeared to a man deeply conversant with several branches of science as only a genuine researcher can know them, and adding to that knowledge a full acquaintance with the history of science. These results, as might be expected, are of the highest value, although there are important distinctions and reasons which he overlooked. John Stuart Mill endeavored to explain the reasonings of science by the nominalistic metaphysics of his father. The superficial perspicuity of that kind of metaphysics rendered his logic extremely popular with those who think, but do not think profoundly, who know something of science, but more from the outside than the inside, and who for one reason or another delight in the simplest theories even if they fail to cover the facts.

71. Mill denies that there was any reasoning in Kepler's

* *Laws of Thought*, chs 16-21

† Including C S Peirce. See Paper No 1, vol 3.

‡ *The Philosophy of the Inductive Sciences*, 1840

procedure. He says it is merely a description of the facts.* He seems to imagine that Kepler had all the places of Mars in space given him by Tycho's observations; and that all he did was to generalize and so obtain a general expression for them. Even had that been all, it would certainly have been inference. Had Mill had even so much practical acquaintance with astronomy as to have practised discussions of the motions of double stars, he would have seen that. But so to characterize Kepler's work is to betray total ignorance of it. Mill certainly never read the *De Motu* [*Motibus*] *Stellae Martis*, which is not easy reading. The reason it is not easy is that it calls for the most vigorous exercise of all the powers of reasoning from beginning to end.

72 What Kepler had given was a large collection of observations of the apparent places of Mars at different times. He also knew that, in a general way, the Ptolemaic theory agrees with the appearances, although there were various difficulties in making it fit exactly. He was furthermore convinced that the hypothesis of Copernicus ought to be accepted. Now this hypothesis, as Copernicus himself understood its first outline, merely modifies the theory of Ptolemy so far as [to] impart to all the bodies of the solar system one common motion, just what is required to annul the mean motion of the sun. It would seem, therefore, at first sight, that it ought not to affect the appearances at all. If Mill had called the work of Copernicus mere description he would not have been *so very far* from the truth as he was. But Kepler did not understand the matter quite as Copernicus did. Because the sun was so near the centre of the system, and was of vast size (even Kepler knew its diameter must be at least fifteen times that of the earth), Kepler, looking at the matter dynamically, thought it must have something to do with causing the planets to move in their orbits. This retrodution, vague as it was, cost great intellectual labor, and was most important in its bearings upon all Kepler's work. Now Kepler remarked that the lines of apsides of the orbits of Mars and of the earth are not parallel, and he utilized various observations most ingeniously to infer that they probably intersected in the sun. Consequently, it must be supposed that a general description of the motion would be

* *Ibid.*, bk. III, ch. 2, §3.

simpler when referred to the sun as a fixed point of reference than when referred to any other point. Thence it followed that the proper times at which to take the observations of Mars for determining its orbit were when it appeared just opposite the sun — the true sun — instead of when it was opposite the *mean* sun, as had been the practice. Carrying out this idea, he obtained a theory of Mars which satisfied the longitudes at all the oppositions observed by Tycho and himself, thirteen in number, to perfection. But unfortunately, it did not satisfy the latitudes at all and was totally irreconcilable with observations of Mars when far from opposition.

73. At each stage of his long investigation, Kepler has a theory which is approximately true, since it approximately satisfies the observations (that is, within $8'$, which is less than any but Tycho's observations could decisively pronounce an error), and he proceeds to modify this theory, after the most careful and judicious reflection, in such a way as to render it more rational or closer to the observed fact. Thus, having found that the centre of the orbit bisects the eccentricity, he finds in this an indication of the falsity of the theory of the equant and substitutes, for this artificial device, the principle of the equable description of areas. Subsequently, finding that the planet moves faster at ninety degrees from its apsides than it ought to do, the question is whether this is owing to an error in the law of areas or to a compression of the orbit. He ingeniously proves that the latter is the case.

74. Thus, never modifying his theory capriciously, but always with a sound and rational motive for just the modification he makes, it follows that when he finally reaches a modification — of most striking simplicity and rationality — which exactly satisfies the observations, it stands upon a totally different logical footing from what it would if it had been struck out at random, or the reader knows not how, and had been found to satisfy the observation. Kepler shows his keen logical sense in detailing the whole process by which he finally arrived at the true orbit. This is the greatest piece of Retroductive reasoning ever performed.

§11. THE STUDY OF THE USELESS

75 The old-fashioned political economist adored, as alone capable of redeeming the human race, the glorious principle of individual greed, although, as this principle requires for its action hypocrisy and fraud, he generally threw in some dash of inconsistent concession to virtue, as a sop to the vulgar Cerberus. But it is easy to see that the only kind of science this principle would favor would be such as is immediately remunerative with a great preference for such as can be kept secret, like the modern sciences of dyeing and perfumery. Kepler's discovery rendered Newton possible, and Newton rendered modern physics possible, with the steam engine, electricity, and all the other sources of the stupendous fortunes of our age. But Kepler's discovery would not have been possible without the doctrine of conics. Now contemporaries of Kepler — such penetrating minds as Descartes and Pascal — were abandoning the study of geometry (in which they included what we now call the differential calculus) so far as that had at that time any existence, because they said it was so **UTTERLY USELESS**. There was the future of the human race almost trembling in the balance, for had not the geometry of conic sections already been worked out in large measure, and had their opinion that only sciences apparently useful ought to be pursued [prevailed] the nineteenth century would have had none of those characters which distinguish it from the *ancien régime*.

76 True science is distinctively the study of useless things. For the useful things will get studied without the aid of scientific men. To employ these rare minds on such work is like running a steam engine by burning diamonds.

77. The University of Paris encouraged useless studies in the most effective way possible, by training so many men as to be almost sure of getting a large proportion of all the minds that could be very serviceable in such studies. At the same time, it provided a sure living not only for such as were really successful, but even for those whose talents were of a somewhat inferior kind. On the other hand, like all universities, it set up an official standard of truth, and frowned on all who questioned it. Just so, the German universities for a whole generation turned the cold shoulder to every man who did not extol their stale Hegelianism, until it became a stench in the nostrils of

every man of common sense. Then the official fashion shifted, and a Hegelian is today treated in Germany with the same arrogant stupidity with which an anti-Hegelian formerly was. Of course, so-called "universities," whose purpose is not the solution of great problems, but merely the fitting of a selection of young men to earn more money than their fellow citizens not so favored, have for the interests of science none of the value of the medieval and German universities, although they exercise the same baleful influence to about the same degree.

78. The small academies of continental Europe are reasonably free from the gravest fault of the universities. Their defect is that while they indirectly do much for their few members they extend little aid to the younger men, except that of giving a general tone of respectability to pure science.

79. The larger bodies give much less aid to individuals; but they begin to aid them sooner. They have a distinct though limited use when they are specialized, like the Union of German chemists. But whether the Royal Society has been as serviceable to science as the French *Académie des Sciences* may be doubted.

§12. *IL LUME NATURALE*

80 In examining the reasonings of those physicists who gave to modern science the initial propulsion which has insured its healthful life ever since, we are struck with the great, though not absolutely decisive, weight they allowed to instinctive judgments. Galileo appeals to *il lume naturale* at the most critical stages of his reasoning. Kepler, Gilbert, and Harvey — not to speak of Copernicus — substantially rely upon an inward power, not sufficient to reach the truth by itself, but yet supplying an essential factor to the influences carrying their minds to the truth.

81. It is certain that the only hope of retroductive reasoning ever reaching the truth is that there may be some natural tendency toward an agreement between the ideas which suggest themselves to the human mind and those which are concerned in the laws of nature.

§13. GENERALIZATION AND ABSTRACTION

82. The most important operation of the mind is that of generalization. There are some exceedingly difficult questions of theoretical logic connected with generalization. On the other hand, there are some valuable lessons which evade those puzzles. If we look at any earlier work upon mathematics as compared with a later one upon the same subject, that which most astonishes us is to see the difficulty men had in first seizing upon general conception which after we become a little familiarized to them are quite matters of course. That an Egyptian should have been able to think of adding one-fifth and one-fifth, and yet should not have been content to call the sum two-fifths, but must call it one-third plus one-fifteenth, as if he could not conceive of a sum of fractions unless their denominators were different—seem perverse stupidity. That decimals should have been so slow in coming in, and that, when they did come, the so-called decimal point should be written as if the relation of units to tenths were somehow peculiar, while what was logically called for was simply some mark attached to the units place, so that instead of 3.11159 [what] should have been written [was] 311159, seems very surprising. That Descartes should have thought it necessary to work problems in analytical geometry four times over, according to the different quadrants between the axes of coordinates in which the point to be determined might occur, is astonishing. That which the early mathematicians failed to see in all these cases was that some feature which they were accustomed to insert into their theorems was quite irrelevant and could perfectly well be omitted without affecting in the slightest degree the cogency of any step of the demonstrations.

83. Another operation closely allied to generalization is abstraction, and the use of it is perhaps even more characteristic of mathematical reasoning than is generalization. This consists of seizing upon something which has been conceived as a *ἔπος πτερόεν*, a meaning not dwelt upon but through which something else is discerned, and converting it into an *ἔπος ἀπτερόεν*, a meaning upon which we rest as the principal subject of discourse. Thus, the mathematician conceives an operation as something itself to be operated upon. He conceives the collection of places of a moving particle as itself a

place which can at one instant be totally occupied by a filament, which can again move, and the aggregate of all its places, considered as possibly occupied in one instant, is a surface, and so forth.

84. The intimate connection between generalization and continuity is to be pointed out.*

§14. THE EVALUATION OF EXACTITUDE

85. For every line of scientific research there is in any given stage of its development, an appropriate standard of certitude and exactitude, such that it is useless to require more, and unsatisfactory to have less. This is a part of the doctrine of the Economy of Research. When Phoenix† made his celebrated survey of the route from San Francisco to the Mission of Dolores, the distance required was the sum of two parts, one of them resting on the guess of a driver, while the other was determined at great expense to a transcendental precision. As long as one part of the distance was extremely uncertain, there was no use in spending much money in ascertaining the other part precisely. For there is a relation between the value of an increased certainty of an item of knowledge and the cost of such increase of certainty, which enables us to determine whether it is better to expend our genius, energy, time, and money upon one investigation or upon another.

86. If a result is to be used merely to confirm the result of an independent investigation, it may have a high value even though its probability is not very high. But if it is only to be used in combination with other results, very little will be gained by increasing its probability far beyond the probabilities of those others. Of course, knowledge that is to be put to special purposes may need to be more precise than other knowledge. Thus, it pays to determine the places of a thousand stars with the utmost accuracy, leaving hundreds of thousands only roughly located, and others only recorded upon photographs. But where a high degree of exactitude and probability is unattainable, that is no reason for refusing to accept such knowledge as we can attain. Because we cannot reach great certainty about the life and teachings of Pythagoras is no reason

* See vol 6, bk I, ch. 7.

† In his *Phoenixiana*, "Official Report."

for sulkily dismissing the subject as one we know nothing about, as Dr. Ed. Zeller[†] would have us do.

§15. SCIENCE AND EXTRAORDINARY PHENOMENA

87. Science is from the nature of its procedure confined to the investigation of the ordinary course of nature. I do not mean that it cannot investigate individual objects, such as the earth. But all its explanations of such objects must be limited to the supposition that they have come about in the ordinary course of nature. A statistical result may be obtained.

88. We may find that such and such a proportion of calves have five legs. But we never can conclude with any probability that the ratio is strictly zero, and even if we knew that the proportion of men with golden thighs is exactly zero, that would be no argument at all against Pythagoras having had a golden thigh. For something might be true of one man, or any number of men, and yet might occur in the long run in a finite number of cases out of an infinite series. Now a finite number divided by infinity is exactly zero. That Pythagoras had a golden thigh is the testimony of history. It is asserted by Aristotle, of all possible authorities the highest, by both Porphyry and Jamblichus after Nicomachus, by Herodotus, by Plutarch, Diogenes Laertius, Aelian, Apollonius,[†] etc. This is far stronger testimony than we have for the resurrection of Jesus. Are we then to admit as a part of the science of history that Pythagoras had a golden thigh?

89. To do so would be to make a retroductive inference. Now a retroductive conclusion is only justified by its *explaining* an observed fact. An explanation is a syllogism of which the major premiss, or rule, is a known law or rule of nature, or other general truth; the minor premiss, or case, is the hypothesis or retroductive conclusion, and the conclusion, or result, is the observed (or otherwise established) fact. Such an explanation, in this case, would be like this:

* *Der Philosophie der Griechen*, S. 279

† Peirce seems to have secured his authorities from Zeller's *A History of Greek Philosophy*, 1881, vol 1, p 328, n 4. Zeller's references are not all accurate, and the authorities quoted are not independent. Peirce's annotated copy of this book is now, through the gift of his wife, the property of the Harvard College Library.

Every fact about Pythagoras (unless kept secret or insignificant) would be reported by his ancient biographers

That Pythagoras had a golden thigh was a fact about Pythagoras neither secret nor insignificant.

∴ That Pythagoras had a golden thigh would be reported by all his ancient biographers.

90. But this syllogism may be condemned at once on the ground that it supposes we have statistical knowledge about such kinds of facts as are quite contrary to the usual course of nature. If the reply be made that it could make in regard to the reporting of the fact no difference whether it were a natural one or not, I rejoin, that granting that, it is not to the purpose. It only goes to show that there is no difference between natural and supernatural facts in this respect, from which the only just inference is that no such proposition can be known even in respect to natural facts. This, indeed, is the case. We cannot say that every remarkable public fact about Pythagoras would be reported, but only that every phenomenon would be told as it appeared to people in an almost primitive state of civilization. Nobody can think that the golden thigh was treated as a modern assayer would treat a gold brick. It was probably flexible and therefore its golden appearance was superficial. One of these days, we may find out something about the ancient Persians, Chorasians, or Brahmins which may make this story significant. At present, it only illustrates the impossibility of science making any assertion about a fact out of the course of nature. Pythagoras was certainly a wonderful man. We have no right, at all, to say that supernal powers had not put a physical mark upon him as extraordinary as his personality. Science can no more deny a miracle than it can assert one.

91. But although science cannot infer any particular violation of the ordinary course of nature, it may very well be that it should find evidence that such violations are so frequent and usual that this fact is itself a part of the ordinary course of nature. For that reason, it is perfectly proper that science should inquire, for example, into the evidences of the fulfillment of prayers, etc. That is something open to experimental inquiry, and until such inquiry has been instituted nobody is entitled to any opinion whatever, or any bias, as to its result.

§16. REASONING FROM SAMPLES

92. Many persons seem to suppose that the state of things asserted in the premisses of an induction renders the state of things asserted in the conclusion probable. The fact that Macaulay's essay on Bacon was admired in its day shows how little the absurdity of such a position was perceived. Even John Stuart Mill holds that the uniformity of nature makes the one state of things follow from the other. He overlooks the circumstance that if so it ought to follow necessarily, while in truth no definite probability can be assigned to it without absurd consequences. He also overlooks the fact that inductive reasoning does not invariably infer a uniformity, it may infer a diversity. I watch the throws of a die, I notice that about half are odd and half are even, and that they follow one another with the utmost irregularity. I conclude that about half of all the throws of that die are odd and that the odd and even follow one another with great irregularity. How can any principle of uniformity account for the truth of such an induction? Mill never made up his mind in what sense he took the phrase "uniformity of nature" when he spoke of it as the basis of induction. In some passages he clearly means any special uniformity by which a given character is likely to belong to the whole of a species, a genus, a family, or a class if it belongs to any members of that group. In this sense, as well as in others, overlooked by Mill, there is no doubt the knowledge of a uniformity strengthens an inductive conclusion, but it is equally free from doubt that such knowledge is not essential to induction. But in other passages Mill holds that it is not the knowledge of the uniformity, but the uniformity itself that supports induction, and furthermore that it is no special uniformity but a general uniformity in nature. Mill's mind was certainly acute and vigorous, but it was not mathematically accurate, and it is by that trait that I am forced to explain his not seeing that this general uniformity could not be so defined as not on the one hand to appear manifestly false or on the other hand to render no support to induction, or both. He says it means that under similar circumstances similar events will occur. But this is vague. Does he mean that objects alike in all respects but one are alike in that one? But plainly no two different real objects are alike in all respects

but one. Does he mean that objects *sufficiently* alike in other respects are alike in any given respect? But that would be but another way of saying that no two different objects are alike in all respects but one. It is obviously true, but it has no bearing on induction, where we deal with objects which we well know are, like all existing things, alike in numberless respects and unlike in numberless other respects *

93. The truth is that induction is reasoning from a sample taken at random to the whole lot sampled. A sample is a *random* one, provided it is drawn by such machinery, artificial or physiological, that in the long run any one individual of the whole lot would get taken as often as any other. Therefore, judging of the statistical composition of a whole lot from a sample is judging by a method which will be right on the average in the long run, and, by the reasoning of the doctrine of chances, will be nearly right oftener than it will be far from right

94. That this does justify induction is a mathematical proposition beyond dispute. It has been objected that the sampling cannot be random in this sense. But this is an idea which flies far away from the plain facts. Thirty throws of a die constitute an approximately random sample of all the throws of that die, and that the randomness should be approximate is all that is required

95. This account of the rationale of induction is distinguished from others in that it has as its consequences two rules of inductive inference which are very frequently violated, although they have sometimes been insisted upon. The first of these is that the sample must be a random one. Upon that I shall not dwell here. The other rule is that the character, toward the ascertainment of the proportionate frequency of which in the lot sampled [the sampling is done], must not be determined by the character of the particular sample taken. For example, we must not take a sample of eminent men, and studying over them, find that they have certain characters and conclude that all eminent men will have those characters. We must first decide for what character we propose to examine the sample, and only after that decision examine the sample. The reason is that any sample will be peculiar and unlike the aver-

* Mill's views on induction are examined in more detail in vol. 2, bk. III, ch. 9.

age of the lot sampled in innumerable respects. At the same time it will be approximately like the average of the whole lot in the great majority of respects.

96. In order to illustrate the necessity of this rule I take a random sample of eminent persons. It is quite a random one for it consists of the first names on pages 100, 300, 500, 700, 900 of Philip's *Great Index of Biography, Biographical Reference* (second edition, 1881). The names are as follows:

	Born	Died
Francis Baring	1740	1810 Sept. 12
Vicomte de Castane	1760	1794 Jan. 3
Hippostrates (of uncertain age)		
Marquis d' O.	1535	1594 Oct. 24
Theocritus	1480	1536 Oct. 18

Now I might, in violation of the above rule of predesignation, draw the following inductions.

1. Three-fourths of these men were born in a year whose date ends in a cipher. Hence about three-fourths of all eminent men are probably so born. But, in fact, only one in ten is so born.

2. Three eminent men out of four die in autumn. In fact, only one out of four.

3. All eminent men die on a day of the month divisible by three. In fact, one out of three.

4. All eminent men die in years whose date doubled and increased by one gives a number whose last figure is the same as that in the tens' place of the date itself. In fact, only one in ten.

5. All eminent men who were living in any year ending in forty-four died at an age which after subtracting four becomes divisible by eleven. All others die at an age which increased by ten is divisible by eleven.

97. This rule is recognized in the requirement of physicists that a theory shall furnish predictions which shall be verified before any particular weight is accorded to it. The medical men, too, who deserve special mention for the reason that they have had since Galen a logical tradition of their own, recognize this rule, however dimly, in their working against reasoning - "*post hoc, ergo propter hoc*." . . .

§17 THE METHOD OF RESIDUAL PHENOMENA

98. The so-called "method of residual phenomena" is so simple that it hardly calls for any remark. At any early stage of science when there are few observations of a given matter, and those rough ones, a law is made out which, when the observations come to be increased in number and made more accurate, is found not to hold exactly. The departures from this law are found themselves to follow a law which may now be shown to be true. But at a still later date it is found that this law again is interfered with, that there are still more minute departures from it, and these departures are again found to follow a law. All the successive laws so found may be real, or they may be merely empirical formulae . . .

§18. OBSERVATION

99. I have already remarked that a definition of science in general which shall express a really intelligent conception of it as a living historic entity must regard it as the occupation of that peculiar class of men, the scientific men. The same remark may be extended to definitions of the different branches of science. The men who pursue a given branch herd together. They understand one another, they live in the same world, while those who pursue another branch are for them foreigners.

100. It will be found upon close examination that that which renders the modes of thought of the students of a special branch of science peculiar is that their experience lies in a peculiar region. And the cause of this is that they are trained and equipped to make a peculiar kind of observations. The man who is continually making chemical analyses lives in a different region of nature from other men. The same thing is even more true of men who are constantly using a microscope.

101. It comes to this, that sciences must be classified according to the peculiar means of observation they employ.

102. So too the great landmarks in the history of science are to be placed at the points where new instruments, or other means of observation, are introduced. Astronomy before the telescope and astronomy after the telescope. Prephotographic astronomy and photographic astronomy. Chemistry before the exact analytic balance, and after.

§19. EVOLUTION

103. The evolutionary theory in general throws great light upon history and especially upon the history of science — both its public history and the account of its development in an individual intellect. As great a light is thrown upon the theory of evolution in general by the evolution of history, especially that of science — whether public or private.

104. The main theories of the evolution of organic species are three. First, the theory of Darwin, according to which the entire interval from Moner to Man has been traversed by successive purely fortuitous and insensible variations *in reproduction*. The changes on the whole follow a determinate course simply because a certain amount of change in certain directions destroys the species altogether, as the final result of successive weakenings of its reproductive power. Second, the theory of Lamarck, according to which the whole interval has been traversed by a succession of very minute changes. But these have not taken place in reproduction, which has absolutely nothing to do with the business, except to keep the average individuals plastic by their youth. The changes have not been fortuitous but wholly the result of strivings of the individuals. Third, the theory of cataclysmal evolution, according to which the changes have not been small and have not been fortuitous, but they have taken place chiefly in reproduction. According to this view, sudden changes of the environment have taken place from time to time. These changes have put certain organs at a disadvantage, and there has been an effort to use them in new ways. Such organs are particularly apt to sport in reproduction and to change in the way which adapts them better to their recent mode of exercise.

105. Notwithstanding the teachings of Weismann, it seems altogether probable that all three of these modes of evolution have acted. It is probable that the last has been the most efficient. These three modes of organic evolution have their parallels in other departments of evolution.

106. Let us consider, for example, the evolution of standards of weights and measures. In order to define the word "pound" in the *Century Dictionary*,* I made a list of about

* See 209. Peirce wrote the definitions of terms in mechanics, mathematics astronomy, astrology, weights and measures, logic, metaphysics, all those relating to universities, and many on psychology for the *Century Dictionary*, edition of 1889.

four hundred pounds which had been in use in different parts of Europe — undoubtedly a very incomplete list, for it was confined in great measure to certain provinces concerning which I was able to obtain information. Each individual pound or measuring stick is from time to time copied, and at length the old one becomes destroyed. The measure of each copy is imperceptibly larger or smaller than its immediate prototype. If then these variations cannot, by gradual summation, produce a standard much smaller without that standard being destroyed as inconvenient while no such destruction would follow upon an increase of the standard, the average of the standards will slowly grow larger by Darwinian evolution. If there were a disposition on the part of owners of pounds to file them down, so as to make them lighter, though not enough to be noticed, then these filed pounds being copied, and the copies filed, there would be a gradual lightening of the pound by Lamarckian evolution. But it is very unlikely that either of these two modes has been a considerable factor in the actual evolution of weights and measures. As long as their circumstances are unchanged, human communities are exceedingly conservative. Nothing short of the despotism of a modern government with a modern police can cause a change in weights and measures. But from time to time changes occur which cause trade to take new routes. Business has to be adapted to new conditions, and under such influences we find all those habits of communities which are rendered unsuitable by the change become plastic enough. Then it is that a new pound or a new yard may be made which is a compromise between a desire to retain old ways and a desire to please new-comers.

107 In the evolution of science, a Darwinian mode of evolution might, for example, consist in this, that at every recall of a judgment to the mind — say, for example, a judgment in regard to some such delicate question as the marriage of the clergy — a slight fortuitous modification of the judgment might take place, the modified judgment would cause a corresponding modification of the belief-habit, so that the next recall would be influenced by this fortuitous modification, though it would depart more or less from it by a new fortuitous modification. If, however, by such summation of modifications an

opinion quite untenable were reached, it would either be violently changed or would be associationally weak and not apt to be recalled. The effect of this would be in the long run that belief would move away from such untenable positions. It is possible that such a mode of influence may affect our instinctive feelings; but there can be nothing of this sort in science, which is controlled and exact. But another sort of Darwinian evolution undoubtedly does take place. We are studying over phenomena of which we have been unable to acquire any satisfactory account. Various tentative explanations recur to our minds from time to time, and at each occurrence are modified by omission, insertion, or change in the point of view, in an almost fortuitous way. Finally, one of these takes such an aspect that we are led to dismiss it as impossible. Then, all the energy of thought which had previously gone to the consideration of that becomes distributed among the other explanations, until finally one of them becomes greatly strengthened in our minds.

108. Lamarckian evolution might, for example, take the form of perpetually modifying our opinion in the effort to make that opinion represent the known facts as more and more observations came to be collected. This is all the time going on in regard, for example, to our estimate of the danger of infection of phthisis. Yet, after all, it does not play a prominent part in the evolution of science. The physical journals — say, for example, Poggendorff's [*Annalen der Physik*] and *Beiblätter* — publish each month a great number of new researches. Each of these is a distinct contribution to science. It represents some good solid, well-trained labor of observation and inference. But as modifying what is already known, the average effect of the ordinary research may be said to be insignificant. Nevertheless, as these modifications are not fortuitous but are for the most part movements toward the truth — could they be rightly understood, all of them would be so — there is no doubt that from decade to decade, even without any splendid discoveries or great studies, science would advance very perceptibly. We see that it is so in branches of physics which remain for a long time without any decisive conquests. It was so, for example, in regard to the classification of the chemical elements in the lapse of time from Berzelius to

Mendeléeff, as the valuable history of Venable* shows. This is an evolution of the Lamarckian type.

109 But this is not the way in which science mainly progresses. It advances by leaps, and the impulse for each leap is either some new observational resource, or some novel way of reasoning about the observations. Such novel way of reasoning might, perhaps, be considered as a new observational means, since it draws attention to relations between facts which would previously have been passed by unperceived.

[I] illustrate by the discoveries of Pasteur,† who began by applying the microscope to chemistry. He picked out the right- and left-handed crystals of tartaric acid. The two kinds have absolutely the same properties except in regard to direction of rotation of the plane of polarization and in their chemical relations to other “optically active” bodies. Since this method of picking out individual crystals was so slow, Pasteur looked for other means. Ferments of appropriate kinds were found to have the same effect. The microscope showed these were due to living organisms, which Pasteur began studying. At that time the medical world was dominated by Claude Bernard’s dictum that a disease is not an entity but merely a sum of symptoms‡. This was pure metaphysics which only barricaded inquiry in that direction. But that was a generation which attached great value to nominalistic metaphysics. Pasteur began with the phylloxera. He found it influenced the “optical activity” of the sugar. This pointed to a ferment and therefore to an entity. He began to extend the doctrine to other diseases. The medical men, dominated by the metaphysics of Claude Bernard, raised all sorts of sophistical objections. But the method of cultures and inoculation proved the thing, and here we see new ideas connected with new observational methods and a fine example of the usual process of scientific evolution. It is not by insensible steps.

§20 SOME A PRIORI DICTA

110 The last fifty years have taught the lesson of not trifling with facts and not trusting to principles and methods which

* *The Development of the Periodic Law*, Easton, Pa., 1896

† See *Oeuvres de Pasteur*, vol. 1, p. 83, Paris, 1922

‡ *Leçons de Pathologie expérimentale*, 2^{me} leçon, Paris, 1872

are not logically founded upon facts and which serve only to exclude testimony from consideration

111. Such, for example, was the dictum of Claude Bernard that a disease is not an entity — a purely metaphysical doctrine. But the observation of facts has taught us that a disease is in many, if not most, serious cases, just as much an entity as a human family consisting of father, mother, and children.

112 Such was the dictum of the old psychology which identified the soul with the ego, declared its absolute simplicity, and held that its faculties were mere names for logical divisions of human activity. This was all unadulterated fancy. The observation of facts has now taught us that the ego is a mere wave in the soul, a superficial and small feature, that the soul may contain several personalities and is as complex as the brain itself, and that the faculties, while not exactly definable and not absolutely fixed, are as real as are the different convolutions of the cortex.

113. Such were the dicta by means of which the internal criticism of historical documents was carried to such a height that it often amounted to the rejection of all the testimony that has come down to us, and the substitution for it of a dream spun out of the critic's brain. But archeological researches have shown that ancient testimony ought to be trusted in the main, with a small allowance for the changes in the meanings of words. When we are told that Pythagoras had a golden thigh, we are to remember that to the ancients gold did not mean a chemical element of atomic weight 197.5 and specific gravity 19.3, melting at 1045° C. and forming saline compounds of the types AuX and AuX_3 . It meant something of metallic lustre, warmer in color than electrum and cooler than copper. Dr. Schliemann's discoveries were the first socdolager that "higher criticism" received. It has since got many others.

114 Such was the dictum of Laplace that stones do not come from heaven.

115. Such were the dicta by which everything of the nature of extraordinary powers connected with psychological states of which the hypnotic trance is an example were set down as tricks. At present, while the existence of telepathy cannot be said to be established, all scientific men are obliged by observed facts to admit that it presents at least a very serious problem requiring respectful treatment.

§21. THE PAUCITY OF SCIENTIFIC KNOWLEDGE

116. Persons who know science chiefly by its results — that is to say, have no acquaintance with it at all as a living inquiry — are apt to acquire the notion that the universe is now entirely explained in all its leading features, and that it is only here and there that the fabric of scientific knowledge betrays any rents.

117 But in point of fact, notwithstanding all that has been discovered since Newton's time, his saying that we are little-children picking up pretty pebbles on the beach while the whole ocean lies before us unexplored remains substantially as true as ever, and will do so though we shovel up the pebbles by steam shovels and carry them off in carloads. An infinitesimal ratio may be multiplied indefinitely and remain infinitesimal still.

118 In the first place all that science has done is to study those relations between objects which were brought into prominence and conceiving which we had been endowed with some original knowledge in two instincts — the instinct of *feeding*, which brought with it elementary knowledge of mechanical forces, space, etc., and the instinct of *breeding*, which brought with it elementary knowledge of psychical motives, of time, etc. All the other relations of things concerning which we must suppose there is vast store of truth are for us merely the object of such false sciences as judicial astrology, palmistry, the doctrine of signatures, the doctrine of correspondences, magic, and the like.

119. In the next place, even within the very bounds to which our science is confined, it is altogether superficial and fragmentary. Want of knowledge of the constitution of matter and of electricity. The conservation of forces, as Helmholtz first enunciated it, untenable, whether it can be universally true in any sense is a difficult problem. To strengthen it Helmholtz greatly insisted on discontinuities — a most objectionable theory from every point of view. Mind quite as little understood as matter, and the relations between the two an enigma. The forces we know can be but a small part of all those that are operative. Our ignorance of small things and great, of distant times and of very slow operations. We are equally ignorant of very rapid performances which neverthe-

less we know to take place. Our science is altogether middle-sized and mediocre. Its insignificance compared with the universe cannot be exaggerated.

§22. THE UNCERTAINTY OF SCIENTIFIC RESULTS

120. It is a great mistake to suppose that the mind of the active scientist is filled with propositions which, if not proved beyond all reasonable cavil, are at least extremely probable. On the contrary, he entertains hypotheses which are almost wildly incredible, and treats them with respect for the time being. Why does he do this? Simply because any scientific proposition whatever is always liable to be refuted and dropped at short notice. A hypothesis is something which looks as if it might be true and were true, and which is capable of verification or refutation by comparison with facts. The best hypothesis, in the sense of the one most recommending itself to the inquirer, is the one which can be the most readily refuted if it is false. This far outweighs the trifling merit of being likely. For after all, what is a *likely* hypothesis? It is one which falls in with our preconceived ideas. But these may be wrong. Their errors are just what the scientific man is out gunning for more particularly. But if a hypothesis can quickly and easily be cleared away so as to go toward leaving the field free for the main struggle, this is an immense advantage.

121. Retrodution goes upon the hope that there is sufficient affinity between the reasoner's mind and nature's to render guessing not altogether hopeless, provided each guess is checked by comparison with observation. It is true that agreement does not show the guess is right, but if it is wrong it must ultimately get found out. The effort should therefore be to make each hypothesis, which is practically no more than a question, as near an even bet as possible.

§23. THE ECONOMY OF RESEARCH

122. Dr. Ernst Mach, who has one of the best faults a philosopher can have, that of riding his horse to death, does just this with his principle of Economy in science.* But of

* See, e g., the lecture on the "Economical Nature of Physical Inquiry" in the *Popular Scientific Lectures* (1895)

course there is a doctrine of the Economies of Research. One or two of its principles are easily made out. The value of knowledge is, for the purposes of science, in one sense absolute. It is not to be measured, it may be said, in money; in one sense that is true. But knowledge that leads to other knowledge is more valuable in proportion to the trouble it saves in the way of expenditure to get that other knowledge. Having a certain fund of energy, time, money, etc., all of which are merchantable articles to spend upon research, the question is how much is to be allowed to each investigation; and *for us* the value of that investigation is the amount of money it will pay us to spend upon it. *Relatively*, therefore, knowledge, even of a purely scientific kind, has a money value.

This value increases with the fullness and precision of the information, but plainly it increases slower and slower as the knowledge becomes fuller and more precise. The cost of the information also increases with its fullness and accuracy, and increases faster and faster the more accurate and full it is. It therefore *may* be the case that it does not pay to get *any* information on a given subject, but, at any rate, it *must* be true that it does not pay (in any given state of science) to push the investigation beyond a certain point in fullness or precision.

123. If we have a number of studies in which we are interested, we should commence with the most remunerative and carry that forward until it becomes no more than equally remunerative with the commencement of another, carry both forward at such rates that they are equally remunerative until each is no more remunerative than a third, and so on.

124. If two or more kinds of knowledge are so related that one can replace the other so that the possession of one renders the other less profitable, this will diminish the investigation of either while increasing the investigation of all.

125. If two or more kinds of information are of use only as supplementing one another, that is, only when combined together, this will increase the investigations until there is little or no profit from the least profitable kind of research.

CHAPTER 3

NOTES ON SCIENTIFIC PHILOSOPHY

§1. LABORATORY AND SEMINARY PHILOSOPHIES*

126.... The kind of philosophy which interests me and must, I think, interest everybody is that philosophy, which uses the most rational methods it can devise, for finding out the little that can as yet be found out about the universe of mind and matter from those observations which every person can make in every hour of his waking life. It will not include matters which are more conveniently studied by students of special sciences, such as psychology. Thus, everybody has remarked that there are four prominent qualities of the sense of taste, sweet, sour, salt, and bitter. But there may be other tastes, not so readily made out without special study, and in any case tastes are conveniently studied in connexion with flavors and odors, which make a difficult experimental inquiry. Besides, the four tastes are altogether special and throw no light on the problems which, on account of their extreme generality, will naturally be examined by a class of researchers of entirely different aptitudes from those which adapt men to the discovery of recondite facts.

127. If anybody asks what there is in the study of obvious phenomena to make it particularly interesting, I will give two answers. The first is the one which seems to me the strongest; the other is that which nobody can fail to feel the force of. The first answer is that the spirit in which, as it seems to me, philosophy ought to be studied is the spirit in which every branch of science ought to be studied, namely, the spirit of joy in learning ourselves and in making others acquainted with the glories of God. Each person will feel this joy most in the

* From "Introduction showing the point of view from which Philosophy appears to the author to be an interesting subject to a man of common-sense," in the Notebook, "Sketch of Some Proposed Chapters on the Sect of Philosophy Called Pragmatism" c. 1905

particular branch of science to which his faculties are best adapted. It is not a sin to have no taste for philosophy as I define philosophy. As a matter of fact, however, almost everybody does feel an interest in philosophical problems, especially at that time of life at which he is spoiling for an intellectual tussle.

128. It is true that philosophy is in a lamentably crude condition at present, that very little is really established about it, while most philosophers set up a pretension of knowing all there is to know — a pretension calculated to disgust anybody who is at home in any real science. But all we have to do is to turn our backs upon all such truly vicious conduct, and we shall find ourselves enjoying the advantages of having an almost virgin soil to till, where a given amount of really scientific work will bring in an extraordinary harvest, and that a harvest of very fundamental truth of exceptional value from every point of view.

129. This consideration touches upon the second reason for studying laboratory-philosophy (as contradistinguished from seminary-philosophy). It is that the special sciences are obliged to take for granted a number of most important propositions, because their ways of working afford no means of bringing these propositions to the test. In short, they always rest upon metaphysics. At one time, for example, we find physicists, Kelvin, Maxwell and others, assuming that a body cannot act where it is not, meaning by "where it is not" where its lines of force do not centre. At another time, we find them assuming that the laws of mechanics (including the principles of metric geometry) hold good for the smallest corpuscles. Now it is one thing to infer from the laws of little things how great things, that consist of little things, will act, but it is quite a different thing to infer from the phenomena presented by great things how single things billions of times smaller will act. It is like inferring that because in any country one man in so many will commit suicide, therefore every individual, once in such a period of time, will make an attempt at suicide. The psychical sciences, especially psychology, are, if possible, even more necessitated to assume general principles that cannot be proved or disproved by their ordinary methods of work. The philosopher alone is equipped with the facilities for examining

such "axioms" and for determining the degree to which confidence may safely be reposed in them. Find a scientific man who proposes to get along without any metaphysics — not by any means every man who holds the ordinary reasonings of metaphysicians in scorn — and you have found one whose doctrines are thoroughly vitiated by the crude and uncriticized metaphysics with which they are packed. We must philosophize, said the great naturalist Aristotle*— if only to avoid philosophizing. Every man of us has a metaphysics, and has to have one; and it will influence his life greatly. Far better, then, that that metaphysics should be criticized and not be allowed to run loose. A man may say "I will content myself with common sense." I, for one, am with him there, in the main. I shall show why I do not think there can be any *direct* profit in going behind common sense — meaning by common sense those ideas and beliefs that man's situation absolutely forces upon him. We shall later see more definitely what is meant.† I agree, for example, that it is better to recognize that some things are red and some others blue, in the teeth of what optical philosophers say, that it is merely that some things are resonant to shorter ether waves and some to longer ones. But the difficulty is to determine what really is and what is not the authoritative decision of common sense and what is merely *obiter dictum*. In short, there is no escape from the need of a critical examination of "first principles."

§2. AXIOMS‡

130. The science which, next after logic, may be expected to throw the most light upon philosophy, is mathematics. It is historical fact, I believe, that it was the mathematicians Thales, Pythagoras, and Plato who created metaphysics, and that metaphysics has always been the ape of mathematics. Seeing how the propositions of geometry flowed demonstratively from a few postulates, men got the notion that the same must be true in philosophy. But of late mathematicians have fully agreed that the axioms of geometry (as they are wrongly called) are not by any means evidently true. Euclid, be it

* *Metaphysics*, bk. I, 982b-3a.

† See vol. 5, bk. II, ch. 7 and bk. III, chs. 2 and 3.

‡ Unpaginated fragment, c. 1893.

observed, never pretended they were evident; he does not reckon them among his κοινὰ ἔννοιαι, or things everybody knows,¹ but among the αἰτήματα, postulates, or things the author must beg you to admit, because he is unable to prove them. At any rate, it is now agreed that there is no reason whatever to think the sum of the three angles of a triangle precisely equal to 180 degrees. It is generally admitted that the evidence is that the departure from 180 degrees (if there is any) will be greater the larger the triangle, and in the case of a triangle having for its base the diameter of the earth's orbit and for its apex the furthest star, the sum hardly can differ, according to observation, so much as 0.1" It is probable the discrepancy is far less Nevertheless, there is an infinite number of different possible values, of which precisely 180 degrees is only one, so that the probability is as 1 to ∞ or 0 to 1, that the value is just 180 degrees In other words, it seems for the present impossible to suppose the postulates of geometry precisely true The matter is reduced to one of evidence, and as absolute precision [is] beyond the reach of direct observation, so it can never be rendered probable by evidence, which is indirect observation.

131. Thus, the postulates of geometry must go into the number of things approximately true. It may be thousands of years before men find out whether the sum of the three angles of a triangle is greater or less than 180 degrees, but the presumption is, it is one or the other.

132. Now what is metaphysics, which has always formed itself after the model of mathematics, to say to this state of things? The mathematical axioms being discredited, are the metaphysical ones to remain unquestioned? I trow not There is one proposition, now held to be very certain, though denied throughout antiquity, namely that every event is precisely determined by general laws, which evidently never can be rendered probable by observation, and which, if admitted, must, therefore, stand as self-evident This is a metaphysical postulate closely analogous to the postulates of geometry. Its fate is

¹ Except the proposition that two lines cannot enclose a space, though only one of the three best manuscripts places even this in the list. But what Eu meant was that two straight lines can have but one intersection, which is evident.

sealed. The geometrical axioms being exploded, this is for the future untenable. Whenever we attempt to verify a physical law, we find discrepancies between observation and theory, which we rightly set down as errors of observation. But now it appears we have no reason to deny that there are similar, though no doubt far smaller, discrepancies between the law and the real facts. As Lucretius says,* the atoms swerve from the paths to which the laws of mechanics would confine them. I do not now inquire whether there is or not any positive evidence that this is so. What I am at present urging is that this arbitrariness is a conception occurring in logic, encouraged by mathematics, and ought to be regarded as a possible material to be used in the construction of a philosophical theory, should we find that it would suit the facts. We observe that phenomena approach very closely to satisfying general laws; but we have not the smallest reason for supposing that they satisfy them precisely.

§3. THE OBSERVATIONAL PART OF PHILOSOPHY†

133 Every science has a mathematical part, a branch of work that the mathematician is called in to do. We say, "Here, mathematician, suppose such and such to be the case. Never you mind whether it is really so or not; but tell us, supposing it to be so, what will be the consequence." Thus arise mathematical psychology, mathematical stylometry, mathematical economics, mathematical physics, mathematical chemistry, mathematical meteorology, mathematical biology, mathematical geology, mathematical astronomy, etc., etc., etc. But there is none of these mathematical offices which constitutes quite so large a proportion of the whole science to which it is annexed as mathematical philosophy, for the obvious reason that the observational part of philosophy is a simple business, compared, for example, with that of anatomy or biography, or any other special science.

134 To assume, however, that the observational part of philosophy, because it is not particularly laborious, is therefore

* *De Rerum Natura*, bk. II, l. 216ff

† From "The Idea of a Law of Nature among the Contemporaries of David Hume and among Advanced Thinkers of the Present Day," c. 1894

easy, is a dreadful mistake, into which the student is very apt to fall, and which gives the death-blow to any possibility of his success in this study. It is, on the contrary, extremely difficult to bring our attention to elements of experience which are continually present. For we have nothing in experience with which to contrast them, and without contrast, they cannot excite our attention. We can only contrast them with imaginary states of things, but even what we imagine is but a crazy-quilt of bits snipped off from actual experiences. The result is that round-about devices have to be resorted to, in order to enable us to perceive what stares us in the face with a glare that, once noticed, becomes almost oppressive with its insistency. This circumstance alone would be sufficient to render philosophical observation difficult — much more difficult, for example, than the kind of observation which the painter has to exercise. Yet this is the least of the difficulties of philosophy. Of the various hindrances more serious still, I may mention once more the notion that it is an extremely easy thing to perceive what is before us every day and hour. But quite the worst is, that every man becomes more or less imbued with philosophical opinions, without being clearly aware of it. Some of these, it is true, may be right opinions, if he is a quite uneducated man, they doubtless will be so. But even if they are right, or nearly right, they prevent true observation as much as a pair of blue spectacles will prevent a man from observing the blue of the sky. The man will hold the right opinion, but not knowing that it might be founded upon direct observation, he will class it among articles of faith of a pretty dubious character. The more a man is educated in other branches, but not trained in philosophy, the more certain it is that two-thirds of his stock of half-conscious philosophical opinions will be utterly wrong, and will completely blind him to the truth, which he will gradually become unable so much as to conceive. I remember a really eminent French *savant*, who had sojourned for very many months in America, but who must have imbibed in his childhood the notion, then common in France, that Englishmen and Americans interject into every second sentence a certain word which the French imagine to be English. He belonged to one of the most observant of races, he was naturally a keen observer; and he was trained in an observational science, and

yet, in order to assimilate himself as much as possible to American ways, he used to think it necessary to greet one every morning with a "How do you do, goddam?" and to keep it up all day. He actually believed that he had observed that such was the American style. The educated man who is a beginner in philosophy is just like that man, who (be it remembered) had been moving about in America for years, — and by a beginner in philosophy I wish to be understood as meaning, in the case of an educated man, one who has not been seriously, earnestly, and single-mindedly devoted to the study of it for more than six or eight years. For there is no other science for which the preparatory training requires to be nearly so severe and so long, no matter how great the natural genius of the student may be. For a plain man or a boy who should be early taken in hand by an instructor capable of making him comprehend both sides of every question, the time, without doubt, can be greatly reduced, with untiring industry and energy on the pupil's part.

§4. THE FIRST RULE OF REASON*

135 Upon this first, and in one sense this sole, rule of reason, that in order to learn you must desire to learn, and in so desiring not be satisfied with what you already incline to think, there follows one corollary which itself deserves to be inscribed upon every wall of the city of philosophy:

Do not block the way of inquiry.

136. Although it is better to be methodical in our investigations, and to consider the economics of research, yet there is no positive sin against logic in *trying* any theory which may come into our heads, so long as it is adopted in such a sense as to permit the investigation to go on unimpeded and undiscouraged. On the other hand, to set up a philosophy which barricades the road of further advance toward the truth is the one unpardonable offence in reasoning, as it is also the one to which metaphysicians have in all ages shown themselves the most addicted.

Let me call your attention to four familiar shapes in which this venomous error assails our knowledge:

* From unpaginated ms. "F. R. L.," c. 1899.

137. The first is the shape of absolute assertion. That we can be sure of nothing in science is an ancient truth. The Academy taught it. Yet science has been infested with over-evident assertion, especially on the part of the third-rate and fourth-rate men, who have been more concerned with teaching than with learning, at all times. No doubt some of the geometries still teach as a self-evident truth the proposition that if two straight lines in one plane meet a third straight line so as to make the sum of the internal angles on one side less than two right angles those two lines will meet on that side if sufficiently prolonged. Euclid, whose logic was more careful, only reckoned this proposition as a *Postulate*, or arbitrary Hypothesis. Yet even he places among his axioms the proposition that a part is less than its whole, and falls into several conflicts with our most modern geometry in consequence. But why need we stop to consider cases where some subtilty of thought is required to see that the assertion is not warranted when every book which applies philosophy to the conduct of life lays down as positive certainty propositions which it is quite as easy to doubt as to believe?

138. The second bar which philosophers often set up across the roadway of inquiry lies in maintaining that this, that, and the other never can be known. When Auguste Comte was pressed to specify any matter of positive fact to the knowledge of which no man could by any possibility attain, he instanced the knowledge of the chemical composition of the fixed stars, and you may see his answer set down in the *Philosophie positive*.^{*} But the ink was scarcely dry upon the printed page before the spectroscope was discovered and that which he had deemed absolutely unknowable was well on the way of getting ascertained. It is easy enough to mention a question the answer to which is not known to me today. But to aver that that answer will not be known tomorrow is somewhat risky, for oftentimes it is precisely the least expected truth which is turned up under the ploughshare of research. And when it comes to positive assertion that the truth never will be found out, that, in the light of the history of our time, seems to me more hazardous than the venture of Andrée.[†]

^{*} 19^{me} leçon

[†] In 1897 Salomon August Andrée attempted to fly over the polar regions in a balloon. He died in the attempt.

- 139. The third philosophical stratagem for cutting off inquiry consists in maintaining that this, that, or the other element of science is basic, ultimate, independent of aught else, and utterly inexplicable — not so much from any defect in our knowing as because there is nothing beneath it to know. The only type of reasoning by which such a conclusion could possibly be reached is *retroduction*. Now nothing justifies a retroductive inference except its affording an explanation of the facts. It is, however, no explanation at all of a fact to pronounce it *inexplicable*. That, therefore, is a conclusion which no reasoning can ever justify or excuse.

140. The last philosophical obstacle to the advance of knowledge which I intend to mention is the holding that this or that law or truth has found its last and perfect formulation — and especially that the ordinary and usual course of nature never can be broken through. “Stones do not fall from heaven,” said Laplace, although they had been falling upon inhabited ground every day from the earliest times. But there is no kind of inference which can lend the slightest probability to any such absolute denial of an unusual phenomenon.

§5. FALLIBILISM, CONTINUITY, AND EVOLUTION*

141. All positive reasoning is of the nature of judging the proportion of something in a whole collection by the proportion found in a sample. Accordingly, there are three things to which we can never hope to attain by reasoning, namely, absolute certainty, absolute exactitude, absolute universality. We cannot be absolutely certain that our conclusions are even approximately true; for the sample may be utterly unlike the unsampled part of the collection. We cannot pretend to be even probably exact; because the sample consists of but a finite number of instances and only admits special values of the proportion sought. Finally, even if we could ascertain with absolute certainty and exactness that the ratio of sinful men to all men was as 1 to 1; still among the infinite generations of men there would be room for any finite number of sinless men with-

* From unpaginated, untitled ms (or mss) which to judge from 159 was intended as part of a lecture c 1897.

out violating the proportion. The case is the same with a seven legged calf

142. Now if exactitude, certitude, and universality are not to be attained by reasoning, there is certainly no other means by which they can be reached

143. Somebody will suggest *revelation*. There are scientists and people influenced by science who laugh at revelation, and certainly science has taught us to look at testimony in such a light that the whole theological doctrine of the "Evidences" seems pretty weak. However, I do not think it is philosophical to reject the possibility of a revelation. Still, granting that, I declare as a logician that revealed truths — that is, truths which have nothing in their favor but revelations made to a few individuals — constitute by far the most uncertain class of truths there are. There is here no question of universality, for revelation is itself sporadic and miraculous. There is no question of mathematical exactitude, for no revelation makes any pretension to that character. But it does pretend to be *certain*; and against that there are three conclusive objections. First, we never can be absolutely certain that any given deliverance really is inspired, for that can only be established by reasoning. We cannot even prove it with any very high degree of probability. Second, even if it is inspired, we cannot be sure, or nearly sure, that the statement is true. We know that one of the commandments was in one of the Bibles printed with[out] a *not* in it *. All inspired matter has been subject to human distortion or coloring. Besides we cannot penetrate the counsels of the most High, or lay down anything as a principle that would govern his conduct. We do not know his inscrutable purposes, nor can we comprehend his plans. We cannot tell but he might see fit to inspire his servants with errors. In the third place, a truth which rests on the authority of inspiration only is of a somewhat incomprehensible nature, and we never can be sure that we rightly comprehend it. As there is no way of evading these difficulties, I say that revelation, far from affording us any certainty, gives results less certain than other sources of information. This would be so even if revelation were much plainer than it is.

144. But, it will be said, you forget the laws which are

* The "Wicked Bible" of 1631 omitted "not" from the Seventh Commandment.

known to us *a priori*, the axioms of geometry, the principles of logic, the maxims of *causality*, and the like. Those are absolutely certain, without exception and exact. To this I reply that it seems to me there is the most positive historic proof that innate truths are particularly uncertain and mixed up with error, and therefore *a fortiori* not without exception. This historical proof is, of course, not infallible; but it is very strong. Therefore, I ask *how do you know* that *a priori* truth is certain, exceptionless, and exact? You cannot know it by *reasoning*. For that would be subject to uncertainty and inexactitude. Then, it must amount to this that you know it *a priori*; that is, you take *a priori* judgments at their own valuation, without criticism or credentials. That is barring the gate of inquiry.

145. Ah! but it will be said, you forget direct experience. Direct experience is neither certain nor uncertain, because it affirms nothing — it just *is*. There are delusions, hallucinations, dreams. But there is no mistake that such things really do appear, and direct experience means simply the appearance. It involves no error, because it testifies to nothing but its own appearance. For the same reason, it affords no certainty. It is not *exact*, because it leaves much vague; though it is not *inexact* either; that is, it has no false exactitude.

146. All this is true of direct experience at its first presentation. But when it comes up to be criticized it is past, itself, and is represented by *memory*. Now the deceptions and inexactitude of memory are proverbial.

147. . . . On the whole, then, we cannot in any way reach perfect certitude nor exactitude. We never can be absolutely sure of anything, nor can we with any probability ascertain the exact value of any measure or general ratio.

This is my conclusion, after many years study of the logic of science, and it is the conclusion which others, of very different cast of mind, have come to, likewise. I believe I may say there is no tenable opinion regarding human knowledge which does not legitimately lead to this corollary. Certainly there is nothing new in it, and many of the greatest minds of all time have held it for true.

148. Indeed, most everybody will admit it until he begins to see what is involved in the admission — and then most people will draw back. It will not be admitted by persons

utterly incapable of philosophical reflection. It will not be fully admitted by masterful minds developed exclusively in the direction of action and accustomed to claim practical infallibility in matters of business. These men will admit the incurable fallibility of all opinions readily enough, only, they will always make exception of their own. The doctrine of fallibilism will also be denied by those who fear its consequences for science, for religion, and for morality. But I will take leave to say to these highly conservative gentlemen that however competent they may be to direct the affairs of a church or other corporation, they had better not try to manage science in that way. Conservatism — in the sense of a dread of consequences — is altogether out of place in science — which has on the contrary always been forwarded by radicals and radicalism, in the sense of the eagerness to carry consequences to their extremes. Not the radicalism that is cocksure, however, but the *radicalism that tries experiments*. Indeed, it is precisely among men animated by the spirit of science that the doctrine of fallibilism will find supporters.

- 149 Still, even such a man as that may well ask whether I propose to say that it is not quite certain that twice two are four — and that it is even not probably quite exact! But it would be quite misunderstanding the doctrine of fallibilism to suppose that it means that twice two is probably not exactly four. As I have already remarked, it is not my purpose to doubt that people can usually *count* with accuracy. Nor does fallibilism say that men cannot attain a sure knowledge of the creations of their own minds. It neither affirms nor denies that. It only says that people cannot attain absolute certainty concerning questions of fact. Numbers are merely a system of names devised by men for the purpose of counting.* It is a matter of real fact to say that in a certain room there are two persons. It is a matter of fact to say that each person has two eyes. It is a matter of fact to say that there are four eyes in the room. But to say that *if* there are two persons and each person has two eyes there *will be* four eyes is not a statement of fact, but a statement about the system of numbers which is our own creation.

150 Still, if the matter is pressed, let me ask whether any

* See 4 155ff

individual here present thinks there is no room for possible doubt that twice two is four?

What do *you* think? You have heard of hypnotism. You know how common it is. You know that about one man in *twenty* is capable of being put into a condition in which he holds the most ridiculous nonsense for unquestionable truth. How does any individual here know but that I am a hypnotist and that when he comes out of my influence he may see that twice two is four is merely his distorted idea, that in fact everybody knows it isn't so? Suppose the individual I am addressing to be enormously wealthy. Then I ask: "Would you, in view of this possibility — or with the possibility that you are seized with a temporary insanity, risk your entire fortune this minute against one cent, on the truth of twice two being four?" You certainly ought not to do so, for you could not go on making very many millions of such bets before you would *lose!* Why, according to my estimate of probabilities there is not a single truth of science upon which we ought to bet more than about a million of millions to one — and that truth will be a general one and not a special fact. People say "Such a thing is as certain as that the sun will rise tomorrow!" I like that phrase for its great moderation because it is infinitely far from certain that the sun will rise tomorrow.

151. To return to our friends the Conservatives, these ladies and gentlemen will tell me this doctrine of fallibilism can never be admitted because the consequences from it would undermine Religion. I can only say I am very sorry. The doctrine is true; — without claiming absolute certainty for it, it is *substantially* unassailable. And if its consequences are antagonistic to religion, so much the worse for religion. At the same time, I do not believe they are so antagonistic. The dogmas of a church may be infallible — infallible in the sense in which it is infallibly true that it is wrong to murder and steal — practically and substantially infallible. But what use a church could make of a mathematical infallibility, I fail to see. *Messieurs et mesdames les conservateurs* have generally taken the lead in determining what the church should say to the novelties of science; and I don't think they have managed the business with very distinguished success so far. They have begun by recoiling with horror from the alleged heresies —

about the rotundity of the earth, about its rotation, about geology, about Egyptian history, and so forth — and they have ended by declaring that the church never breathed a single word against any of these truths of science. Perhaps, it be just so with fallibility. For the present those knowing in divine things insist that infallibility is the prerogative of the church, but maybe bye and bye we shall be told that this infallibility had always been taken in an *ecclesiastical sense*. And that will be *true*, too. I should not wonder if the churches were to be quite agile in reformed teachings during the coming thirty years. Even one that mainly gathers in the very ignorant and the very rich may feel young blood in its veins.

152. But doubtless many of you will say, as many most intelligent people have said, Oh, we grant your *fallibilism* to the extent you insist upon it. It is nothing new. Franklin said a century ago that nothing was certain. We will grant it would be foolish to bet ten years' expenditure of the United States Government against one cent upon any fact whatever. But practically speaking many things are substantially certain. So, after all, of what importance is your *fallibilism*?

We come then to this question. of what importance is it? Let us see.

153. How *can* such a little thing be of importance, you will ask? I answer after all there is a difference between something and nothing. If a metaphysical theory has come into general vogue, which can rest on nothing in the world but the assumption that absolute exactitude and certitude are to be attained, and if that metaphysics leaves us unprovided with pigeon-holes in which to file important facts so that they have to be thrown in the fire — or to resume our previous figure if that metaphysical theory seriously blocks the road of inquiry — then it is comprehensible that the little difference between a degree of evidence extremely high and absolute certainty should after all be of great importance as removing a mote from our eye.

154. Let us look then at two or three of the grandest results of science and see whether they appear any different from a fallibilist standpoint from what they would to an infallibilist.

Three of the leading conceptions of science may be glanced at — I mean the ideas of force, of continuity, and of evolution. -

155. . . . The fourth law of motion was developed about forty years ago[†] by Helmholtz and others. It is called the law of the conservation of energy; but in my opinion that is a very misleading name, implying a peculiar aspect of the law under which the real fact at the bottom of it is not clearly brought out. It is therefore not suitable for an abstract and general statement, although it is a point of view which is very serviceable for many practical applications. But the law generally stated is that the changes in the velocities of particles depend exclusively on their relative positions.

It is not necessary now to examine these laws with technical accuracy. It is sufficient to notice that they leave the poor little particle no option at all. Under given circumstances his motion is precisely laid out for him.

We can from the nature of things have no evidence at all tending to show that these laws are absolutely exact. But in some single cases we can see that the approximation to exactitude is quite wonderful.

These laws have had a very wonderful effect upon physical sciences, because they have shown the very high degree of exactitude with which nature acts — at least, in simple configurations. But, as I said before, the logic of the case affords us not one scintilla of reason to think that this exactitude is perfect.

156. The illustrious Phoenix [G. H. Derby], you remember, wrote a series of lectures on astronomy to be delivered at the Lowell Institute in Boston.[‡] But owing to the unexpected circumstance of his not being invited to give any lectures at that Institution, they were ultimately published in *The San Diego Herald*. In those lectures in treating of the sun he mentions how it once stood still at the command of Joshua. But, says he, I never could help thinking that it might have wiggled a very little when Joshua was not looking directly at it. The question is whether particles may not spontaneously swerve[‡] by a very little — less than we can perceive — from the exact

* To judge from this, the ms. should be dated ten years earlier. But the absence of the terms and the handwriting in earlier mss., and their presence in mss. dated 1897-8 seem to indicate that the editorial dating is correct.

† *Phoenixiana*, "Lectures on Astronomy."

requirements of the laws of mechanics We cannot possibly have a right to deny this For such a denial would be a claim to absolute exactitude of knowledge On the other hand, we never can have any right to suppose that any observed phenomenon is simply a sporadic spontaneous irregularity For the only justification ^(scarcely) we can have for supposing anything we don't see is that it would explain how an observed fact could result from the ordinary course of things Now to suppose a thing sporadic, spontaneous, irregular, is to suppose it departs from the ordinary course of things That is blocking the road of inquiry, it is supposing the thing inexplicable, when a supposition can only be justified by its affording an explanation

157. But we may find a general class of phenomena, forming a part of the general course of things, which are explicable not as *an irregularity*, but as the resultant effect of a whole class of irregularities

Physicists often resort to this kind of explanation to account for phenomena which appear to violate the law of the conservation of energy The general properties of gases are explained by supposing the molecules are moving about in every direction in the most diverse possible ways Here, it is true, it is supposed that there is only so much irregularity as the laws of mechanics permit — but the principle is there of explaining a general phenomenon by the statistical regularities that exist among irregularities

158. As there is nothing to show that there is not a certain amount of absolute spontaneity in nature, despite all laws, our metaphysical pigeon-holes should not be so limited as to exclude this hypothesis, provided any general phenomena should appear which might be explained by such spontaneity.

159 Now in my opinion there are several such general phenomena Of these I will at this moment instance but one.

It is *the* most obtrusive character of nature It is so obvious, that you will hardly know at first what it is I mean It is curious how certain facts escape us because they are so pervading and ubiquitous, just as the ancients imagined the music of the spheres was not heard because it was heard all the time. But will not somebody kindly tell the rest of the audience what is the most marked and obtrusive character of nature? Of course, I mean the variety of nature.

160. Now I don't know that it is logically accurate to say that this marvellous and infinite diversity and manifoldness of things is a sign of spontaneity. I am a logical analyst by long training, you know, and to say this is a manifestation of spontaneity seems to me faulty analysis. I would rather say it *is* spontaneity. I don't know what you can make out of the meaning of spontaneity but newness, freshness, and diversity.

161. Let me ask you a little question? Can the operation of *law* create diversity where there was no diversity before? Obviously not, under given circumstances mechanical law prescribes *one* determinate result.

I could easily prove this by the principles of analytical mechanics. But that is needless. You can see for yourselves that law prescribes like results under like circumstances. That is what the word *law* implies. So then, all this exuberant diversity of nature cannot be the result of law. Now what is spontaneity? It is the character of not resulting by law from something antecedent.

162. Thus, the universe is *not* a mere mechanical result of the operation of blind law.* The most obvious of all its characters cannot be so explained. It is the multitudinous facts of all experience that show us this; but that which has opened our eyes to these facts is the principle of fallibilism. Those who fail to appreciate the importance of fallibilism reason: we see these laws of mechanics, we see how extremely closely they have been verified in some cases. We suppose that what we haven't examined is like what we have examined, and that these laws are absolute, and the whole universe is a boundless machine working by the blind laws of mechanics. This is a philosophy which leaves no room for a God! No, indeed! It leaves even human consciousness, which cannot well be denied to exist, as a perfectly idle and functionless *flâneur* in the world, with no possible influence upon anything — not even upon itself. Now will you tell me that this fallibilism amounts to nothing?

163. But in order really to see all there is in the doctrine of fallibilism, it is necessary to introduce the idea of continuity, or unbrokenness. This is the leading idea of the differential calculus and of all the useful branches of mathematics; it plays

* See vol. 6, bk I.

a great part in all scientific thought, and the greater the more scientific that thought is, and it is the master key which adepts tell us unlocks the arcana of philosophy.

164. We all have some idea of continuity. Continuity is fluidity, the merging of part into part. But to achieve a really distinct and adequate conception of it is a difficult task, which with all the aids possible must for the most acute and most logically trained intellect require days of severe thought. If I were to attempt to give you any logical conception of it, I should only make you dizzy to no purpose. I may say this, however. I draw a line. Now the points on that line form a continuous series. If I take any two points on that line, however close together, other points there are lying between them. If that were not so, the series of points would not be continuous. It might be so, even if the series of points were not continuous . . .

165. You will readily see that the idea of continuity involves the idea of infinity. Now, the nominalists tell us that we cannot reason about infinity, or that we cannot reason about it *mathematically*. Nothing can be more false. Nominalists cannot reason about infinity, because they do not reason logically about anything. Their reasoning consists of performing certain processes which they have found worked well — without having any insight into the conditions of their working well. This is not logical reasoning. It naturally fails when infinity is involved, because they reason about infinity as if it were finite. But to a logical reasoner, reasoning about infinity is decidedly simpler than reasoning about finite quantity.

166. There is one property of a continuous expanse that I must mention, though I cannot venture to trouble you with the demonstration of it. It is that in a continuous expanse, say a continuous line, there are continuous lines infinitely short. In fact, the whole line is made up of such infinitesimal parts. The property of these infinitely small spaces is — I regret the abstruseness of what I am going to say, but I cannot help it — the property which distinguishes these infinitesimal distances is that a certain mode of reasoning which holds good of all finite quantities and of some that are not finite does not hold good of them. Namely, mark any point on the line A. Suppose that point to have any character, suppose, for instance,

it is *blue*. Now suppose we lay down the rule that every point within an inch of a blue point shall be painted blue. Obviously, the consequence will be that the whole line will have to be blue. But this reasoning does not hold good of infinitesimal distances. After the point A has been painted blue, the rule that every point infinitesimally near to a blue point shall be painted blue will not necessarily result in making the whole blue. Continuity involves infinity in the strictest sense, and infinity even in a less strict sense goes beyond the possibility of direct experience.

167. Can we, then, ever be sure that anything in the real world is continuous? Of course, I am not asking for an absolute certainty; but can we ever say that it is so with any ordinary degree of security? This is a vitally important question. I think that we have one positive direct evidence of continuity and on the first line but one. It is this. We are immediately aware only of our present feelings — not of the future, nor of the past. The past is known to us by present memory, the future by present suggestion. But before we can interpret the memory or the suggestion, they are past; before we can interpret the present feeling which means memory, or the present feeling that means suggestion, since that interpretation takes time, that feeling has ceased to be present and is now past. So we can reach no conclusion from the present but only from the past.

168. How do we know then on the whole that the past ever existed, that the future ever will exist? How do we know there ever was or ever will be anything but the present instant? Or stop. I must not say *we*. How do I know that anybody but myself ever existed or even I myself exist except for one single instant, the present, and that all this business is not an illusion from top to bottom? Answer. I don't know. But I am trying the hypothesis that it is real, which seems to work excellently so far. Now if this is real, the past is really known to the present. How can it be known? Not by inference; because as we have just seen we can make no inference from the present, since it will be past before the inference gets drawn.

169. Then we must have an immediate consciousness of the past. But if we have an immediate consciousness of a state of consciousness past by one unit of time and if that past state

involved an immediate consciousness of a state then past by one unit, we now have an immediate consciousness of a state past by two units, and as this is equally true of all states, we have an immediate consciousness of a state past by four units, by eight units, by sixteen units, etc., in short we must have an immediate consciousness of every state of mind that is past by any finite number of units of time. But we certainly have not an immediate consciousness of our state of mind a year ago. So a year is more than any finite number of units of time in this system of measurement, or, in other words, there is a measure of time infinitely less than a year. Now, this is only true if the series be continuous. Here, then, it seems to me, we have positive and tremendously strong reason for believing that time really is continuous.

170. Equally conclusive and direct reason for thinking that space and degrees of quality and other things are continuous is to be found as for believing time to be so. Yet, the reality of continuity once admitted, reasons are there, divers reasons, some positive, others only formal, yet not contemptible, for admitting the continuity of all things. I am making a bore of myself and won't bother you with any full statement of these reasons, but will just indicate the nature of a few of them. Among formal reasons, there are such as these, that it is easier to reason about continuity than about discontinuity, so that it is a convenient assumption. Also, in case of ignorance it is best to adopt the hypothesis which leaves open the greatest field of possibility; now a continuum is merely a discontinuous series with additional possibilities. Among positive reasons, we have that apparent analogy between time and space, between time and degree, and so on. There are various other positive reasons, but the weightiest consideration appears to me to be this. How can one mind act upon another mind? How can one particle of matter act upon another at a distance from it? The nominalists tell us this is an ultimate fact—it cannot be explained. Now, if this were meant in [a] merely practical sense, if it were only meant that we know that one thing does act on another but that how it takes place we cannot very well tell, up to date, I should have nothing to say, except to applaud the moderation and good logic of the statement. But this is not what is meant; what is meant is that we

come up, bump against actions absolutely unintelligible and inexplicable, where human inquiries have to stop. Now that is a mere *theory*, and nothing can justify a theory except its explaining observed facts. It is a poor kind of theory which in place of performing this, the sole legitimate function of a theory, merely supposes the facts to be inexplicable. It is one of the peculiarities of nominalism that it is continually supposing things to be absolutely inexplicable. That blocks the road of inquiry. But if we adopt the theory of continuity we escape this illogical situation. We may then say that one portion of mind acts upon another, because it is in a measure immediately present to that other; just as we suppose that the infinitesimally past is in a measure present. And in like manner we may suppose that one portion of matter acts upon another because it is in a measure in the same place.

171. If I were to attempt to describe to you in full all the scientific beauty and truth that I find in the principle of continuity, I might say in the simple language of Matilda the Engaged, "the tomb would close over me e'er the entrancing topic were exhausted"—but not before my audience was exhausted. So I will just drop it here. Only, in doing so, let me call your attention to the natural affinity of this principle to the doctrine of fallibilism. The principle of continuity is the idea of fallibilism objectified. For fallibilism is the doctrine that our knowledge is never absolute but always swims, as it were, in a continuum of uncertainty and of indeterminacy. Now the doctrine of continuity is that *all things* so swim in continua.

172. The doctrine of continuity rests upon observed fact as we have seen. But what opens our eyes to the significance of that fact is fallibilism. The ordinary scientific infallibilist — of which sect Büchner in his *Kraft und Stoff* affords a fine example — cannot accept *synechism*, or the doctrine that all that exists is continuous — because he is committed to discontinuity in regard to all those things which he fancies he has exactly ascertained, and especially in regard to that part of his knowledge which he fancies he has exactly ascertained to be *certain*. For where there is continuity, the exact ascertainment of real quantities is too obviously impossible. No sane man can dream that the ratio of the circumference to the

diameter could be exactly ascertained by measurement. As to the quantities he has not yet exactly ascertained, the Buchnerite is naturally led to separate them into two distinct classes, those which may be ascertained hereafter (and there, as before, continuity must be excluded), and those absolutely unascertainable — and these in their utter and everlasting severance from the other class present a new breach of continuity. Thus scientific infallibilism draws down a veil before the eyes which prevents the evidences of continuity from being discerned.

~ But as soon as a man is fully impressed with the fact that absolute exactitude never can be known, he naturally asks whether there are any facts to show that hard discrete exactitude really exists. That suggestion lifts the edge of that curtain and he begins to see the clear daylight shining in from behind it.

~ 173. But fallibilism cannot be appreciated in anything like its true significance until evolution has been considered. This is what the world has been most thinking of for the last forty years — though old enough is the general idea itself. Aristotle's philosophy, that dominated the world for so many ages and still in great measure tyrannizes over the thoughts of butchers and bakers that never heard of him — is but a metaphysical evolutionism.

174. Evolution means nothing but *growth* in the widest sense of that word. Reproduction, of course, is merely one of the incidents of growth. And what is growth? Not mere increase. Spencer says it is the passage from the homogeneous to the heterogeneous — or, if we prefer English to Spenserese — *diversification*. That is certainly an important factor of it. Spencer further says that it is a passage from the unorganized to the organized, but that part of the definition is so obscure that I will leave it aside for the present. But think what an astonishing idea this of *diversification* is! Is there such thing in nature as increase of variety? Were things simpler, was variety less in the original nebula from which the solar system is supposed to have grown than it is now when the land and sea swarms with animal and vegetable forms with their intricate anatomies and still more wonderful economies? It would seem as if there were an increase in variety, would it not? And yet mechanical law, which the scientific infallibilist

tells us is the only agency of nature. mechanical law can never produce diversification. That is a mathematical truth — a proposition of analytical mechanics. and anybody can see without any algebraical apparatus that mechanical law out of like antecedents can only produce like consequents. It is the very idea of law. So if observed facts point to real growth, they point to another agency, to spontaneity for which infallibilism provides no pigeon-hole. And what is meant by this passage from the less organized to the more organized? Does it mean a passage from the less bound together to the more bound together. the less connected to the more connected, the less regular to the more regular? How can the regularity of the world increase, if it has been absolutely perfect all the time?

175. . . . Once you have embraced the principle of continuity no kind of explanation of things will satisfy you except that they *grew*. The infallibilist naturally thinks that everything always was substantially as it is now. Laws at any rate being absolute could not grow. They either always were, or they sprang instantaneously into being by a sudden fiat like the drill of a company of soldiers. This makes the laws of nature absolutely blind and inexplicable. Their why and wherefore can't be asked. This absolutely blocks the road of inquiry. The fallibilist won't do this. He asks may these *forces* of nature not be somehow amenable to reason? May they not have naturally grown up? After all, there is no reason to think they are absolute. If all things are continuous. the universe must be undergoing a continuous growth from non-existence to existence. There is no difficulty in conceiving existence as a matter of degree. The reality of things consists in their persistent forcing themselves upon our recognition. If a thing has no such persistence, it is a mere dream. Reality, then. is persistence. is regularity. In the original chaos where there was no regularity. there was no existence. It was all a confused dream. This we may suppose was in the infinitely distant past. But as things are getting more regular. more persistent, they are getting less dreamy and more real.

Fallibilism will at least provide a big pigeon-hole for facts bearing on that theory.

BOOK II

THE CLASSIFICATION OF THE SCIENCES

PROEM: THE ARCHITECTONIC CHARACTER OF PHILOSOPHY*

176. The universally and justly lauded parallel which Kant draws between a philosophical doctrine and a piece of architecture has excellencies which the beginner in philosophy might easily overlook, and not the least of these is its recognition of the cosmic character of philosophy. I use the word "cosmic" because *cosmicus* is Kant's own choice, but I must say I think *secular* or *public* would have approached nearer to the expression of his meaning. Works of sculpture and painting can be executed for a single patron and must be by a single artist. A painting always represents a fragment of a larger whole. It is broken at its edges. It is to be shut up in a room and admired by a few. In such a work individuality of thought and feeling is an element of beauty. But a great building, such as alone can call out the depths of the architect's soul, is meant for the whole people, and is erected by the exertions of an army representative of the whole people. It is the message with which an age is charged, and which it delivers to posterity. Consequently, thought characteristic of an individual — the piquant, the nice, the clever — is too little to play any but the most subordinate rôle in architecture. If anybody can doubt whether this be equally true of philosophy, I can but recommend to him that splendid third chapter of the *Methodology*, in the *Critic of the Pure Reason*.

177. To the cosmological or secular character of philosophy (to which, as closely connected, Kant with his unfailing discernment joins the circumstance that philosophy is a thing that has to grow by the fission of minute parts and not by accretion) is due the necessity of planning it out from the beginning. Of course, every painting likewise has its composition; but composition is not a very weighty problem, except in that kind of painting which is accessory to architecture, or is, at any rate, very public in its appeal. Indeed historical painting is one of those exceptions which go to prove the rule that in

* Apparently a foreword to a volume of the *Principles of Philosophy*, c. 1896.

works which aim at being secular, rather than individualistic, the preliminary business of planning is particularly important and onerous

178 And the reason is very plain and simple. The instincts of the lower animals answer their purposes much more unerringly than a discursive understanding could do. But for man discourse of reason is requisite, because men are so intensively individualistic and original that the instincts, which are racial ideas, become smothered in them. A deliberate logical faculty, therefore, has in man to take their place; and the sole function of this logical deliberation is to grind off the arbitrary and the individualistic character of thought. Hence, wherever the arbitrary and the individualistic is particularly prejudicial, there logical deliberation, or discourse of reason, must be allowed as much play as possible

179 That is why philosophy ought to be deliberate and planned out, and that is why, though pitchforking articles into a volume is a favorite and easy method of bookmaking, it is not the one which Mr Peirce has deemed to be the most appropriate to the exposition of the principles of philosophy, so that, instead of making up this book by a collection of his old papers with additions, as he was urged to do, he has preferred to write it entirely anew, as if he had never before set pen to paper.*

* However, for the only philosophical work Peirce ever completed, *The Grand Logic*, the "pitchfork" method was used. The editors, of course, were compelled to "pitchfork," though they have tried to do it according to a plan, suggested by the classifications contained in the present book

CHAPTER 1

AN OUTLINE CLASSIFICATION OF THE SCIENCES*

180. This classification, which aims to base itself on the principal affinities of the objects classified, is concerned not with all possible sciences, nor with so many branches of knowledge, but with sciences in their present condition, as so many businesses of groups of living men. It borrows its idea from Comte's classification; namely, the idea that one science depends upon another for fundamental principles, but does not furnish such principles to that other. It turns out that in most cases the divisions are trichotomic, the First of the three members relating to universal elements or laws, the Second arranging classes of forms and seeking to bring them under universal laws, the Third going into the utmost detail, describing individual phenomena and endeavoring to explain them. But not all the divisions are of this character.

The classification has been carried into great detail,† but only its broader divisions are here given.

181. All science is either, A. Science of Discovery, B. Science of Review; or C. Practical Science.

182. By "science of review" is meant the business of those who occupy themselves with arranging the results of discovery, beginning with digests, and going on to endeavor to form a philosophy of science. Such is the nature of Humboldt's *Cosmos*, of Comte's *Philosophie positive*, and of Spencer's

* Cp 5-9 of *A Syllabus of Certain Topics of Logic*, 1903, Alfred Mudge & Son, Boston bearing the following preface "This syllabus has for its object to supplement a course of eight lectures to be delivered at the Lowell Institute, by some statements for which there will not be time in the lectures, and by some others not easily carried away from one hearing. It is intended to be a help to those who wish seriously to study the subject, and to show others what the style of thought is that is required in such study. Like the lectures themselves, this syllabus is intended chiefly to convey results that have never appeared in print, and much is omitted because it can be found elsewhere."

† See 203ff. where, also, some modifications of the present scheme are to be found. Cf. e.g. 181 and 239.

being performed by means of signs, logic may be regarded as the science of the general laws of signs. It has three branches. 1, Speculative Grammar, or the general theory of the nature and meanings of signs, whether they be icons, indices, or symbols, 2, Critic, which classifies arguments and determines the validity and degree of force of each kind; 3, Methodeutic, which studies the methods that ought to be pursued in the investigation, in the exposition, and in the application of truth. Each division depends on that which precedes it

192 Metaphysics may be divided into, i, General Metaphysics, or Ontology, ii, Psychical, or Religious, Metaphysics, concerned chiefly with the questions of 1, God, 2, Freedom, 3, Immortality, and iii, Physical Metaphysics, which discusses the real nature of time, space, laws of nature, matter, etc. The second and third branches appear at present to look upon one another with supreme contempt.

193 Nomological physics is divided into, i, Molar Physics, Dynamics and Gravitation, ii, Molecular Physics, Elaterics and Thermodynamics; iii, Etherial Physics, Optics and Electrics. Each division has two subdivisions. The dependence of the divisions is well marked.

194 Classificatory physics seems, at present, as a matter of fact, to be divided, quite irrationally and most unequally, into i, Crystallography, ii, Chemistry, iii, Biology.

195. But crystallography is rather an offshoot from chemistry, to which it furnishes a few facts, but hardly a principle. It is highly mathematical and depends also on elaterics. Biology might be regarded (although, as a matter of fact, no such view is taken) as the chemistry of the albumoids and of the forms they assume. It is probable that all the differences of races, individuals, and tissues are chemical, at bottom. At any rate, the possible varieties of albuminoids are amply sufficient for all the diversity of organic forms

seems at present, to consist of, 1, covers the old chemical physics and formulat 2, Organic Chemistry, Ali- upon n Chemistry, consisting of the mic weights, periodicity, etc , seeks t I, Physiology; and 2, Anat-

* However, for the only philo-
Logic, the "pitchfork" method v
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omy. Physiology is closely allied to chemistry and physics Anatomy is divided into many distinct fields, according to the nature of the forms studied.

198 Descriptive physics is divided into, 1, Geognosy, and, 2, Astronomy. Both have various well-known subdivisions.

199. Psychology is most naturally divided, according to the methods it follows, into, i, Introspectional Psychology, ii, Experimental Psychology; iii, Physiological Psychology; iv, Child Psychology

This division only admits those parts of psychology which investigate the general phenomena of mind Special psychology belongs to classificatory psychics Both experimental and physiological psychology are dependent upon introspective psychology But it is hard to say which of them derives most from the other. Child psychology depends on all the others Psychology is too young a science to have any further living divisions than such as are here admitted.

200 Classificatory psychics is divided into, i, Special Psychology, itself consisting of, 1, Individual Psychology, 2, Psychological Heredity, 3, Abnormal Psychology, 4, Mob Psychology; 5, Race Psychology, 6, Animal Psychology, ii, Linguistics, a vast science, divided according to the families of speech, and cross-divided into, 1, Word Linguistics, 2, Grammar, and there should be a comparative science of forms of composition; iii, Ethnology, divided into, 1, the Ethnology of Social Developments, customs, laws, religion, and traditions; and, 2, the Ethnology of Technology.

201. Descriptive psychics is divided into, i, History proper, itself divided according to the nature of its data into, 1, Monumental History, 2, Ancient History with all other history that is drawn from few and general testimonies; 3, History drawn from a wealth of documents, as Modern History, generally History has, beside, two cross-divisions, the one into, 1, Political History; 2, History of the Different Sciences; 3, History of Social Developments, religion, law, slavery, manners, etc , the other according to the different parts of the world and the different peoples whose history is studied, ii, Biography, which at present is rather a mass of lies than a science; iii, Criticism, the study of individual works of mind, itself divided into, 1, Literary Criticism, 2, Art Criticism, of which

the latter is divided into many departments, as Criticism of Military Operations, Criticism of Architecture, etc.

202. The classification of practical sciences has been elaborated by the author, but will not here be touched upon.* No classification of the science of review has been attempted.

* See 243

CHAPTER 2

*A DETAILED CLASSIFICATION OF THE SCIENCES**

§1. NATURAL CLASSES

203. Many have been the attempts at a general classification of the sciences. Dr. Richardson's little book upon the subject¹ is quite incomplete, only enumerating one hundred and forty-six systems. They are naturally many, because not only are their purposes various, but their conceptions of a science are divergent, and their notions of what classification is are still more so. Many of these schemes introduce sciences which nobody ever heard of, so that they seem to aim at classifying, not actually existent sciences, but possible sciences. A somewhat presumptuous undertaking is that of classifying the science of the remote future. On the other hand, if classifications are to be restricted to sciences actually existing at the time the classifications are made, the classifications certainly ought to differ from age to age. If Plato's classification was satisfactory in his day, it cannot be good today, and if it be good now, the inference will be that it was bad when he proposed it.

This business of classifying sciences is not one to be undertaken precipitately or off-hand. That is plain. We should not begin the execution of the task until we have well considered, first, what classification is; and secondly, what science is. . . .

204. The first question then, that it seems well to consider (remembering that classification is one of the topics of logic to be dealt with more scientifically in its proper place, and that I can here only skim the surface of it) is, What is meant by a true and natural class? A great many logicians say there is no such thing, and, what is strange, even many students of

* Section 1, ch 2, of the "Minute Logic," 1902

¹ *Classification, Theoretical and Practical*, by Ernest Cushing Richardson, C Scribner's Sons, N. Y., 1901.

taxonomic sciences not only follow this opinion, but allow it a great part in determining the conclusions of botany and zoology. The cause of their holding this opinion has two factors; first, that they attach a metaphysical signification to the term *natural* or *real class*, and secondly, that they have embraced a system of metaphysics which allows them to believe in no such thing as that which they have defined a real or natural class to be. Far be it from me to wish to close any avenue by which truth may be arrived at; and if botanists and zoologists come to the conclusion that botany and zoology must rest upon metaphysics, I have not a word of objection to make. Only I can tell them that metaphysics is a most difficult science, presenting more pitfalls for the uninformed than almost any, which a mere amateur at it would be foolish to fancy that he could escape. Therefore, if botany and zoology must perforce rest upon metaphysics, by all means let this metaphysics be recognized as an explicit branch of those sciences, and be treated in a thoroughgoing and scientific manner. Having devoted many years to it, I am entitled to my opinion upon a metaphysical question, although it may be a mistaken one, and my opinion is that it is a shallow and sciolistic metaphysics which declares a "real class," in the sense which those writers attach to the term, to be an impossible thing. At the same time, I am unable to see any need at all in positive science for considering such metaphysically real classes. To my apprehension the business of classification has no concern with them, but only with true and natural classes, in another and a purely experiential sense. For example, if I were to attempt to classify the arts, which I shall not do, I should have to recognize, as one of them, the art of illumination, and should have occasion to remark that lamps form a true, real, and natural class, because every lamp has been made and has come into being as a result of an aim common and peculiar to all lamps. A *class*, of course, is the total of whatever objects there may be in the universe which are of a certain description. What if we try taking the term "natural," or "real, class" to mean a class of which all the members owe their existence as members of the class to a common final cause? This is somewhat vague; but it is better to allow a term like this to remain vague, until we see our way to rational precision. In the case of lamps, we know what that cause is. that instinct

which enables us to distinguish human productions and to divine their purpose informs us of this with a degree of certainty which it were futile to hope that any science should surpass. But in the case of natural classes the final cause remains occult. Perhaps, since phrases retain their sway over men's minds long after their meaning has evaporated, it may be that some reader, even at this day, remains imbued with the old notion that there are no final causes in nature, in which case, natural selection, and every form of evolution, would be false. For evolution is nothing more nor less than the working out of a definite end. A final cause may be conceived to operate without having been the purpose of any mind that supposed phenomenon goes by the name of *fate*. The doctrine of evolution refrains from pronouncing whether forms are simply fated or whether they are providential, but that definite ends are worked out none of us today any longer deny. Our eyes have been opened, and the evidence is too overwhelming. In regard to natural objects, however, it may be said, in general, that we do not know precisely what their final causes are. But need that prevent us from ascertaining whether or not there is a common cause by virtue of which those things that have the essential characters of the class are enabled to exist?

205. The manner of distribution of the class-character will show, with a high degree of certainty, whether or not it is determinative of existence. Take, for example, the class of animals that have legs. The use of legs is clear to us, having them ourselves. But if we pass the animal kingdom in review, we see that in the majority of branches there are no such organs of locomotion, while in the others they are present throughout some whole classes, and absent throughout others, and in still others are sometimes present, sometimes absent. With such a distribution, this mode of locomotion may be so connected with the possibility of a form, that two animals of the same order could not differ in respect to using legs, but it is evident that animals having legs do not form a natural group, for they are not separated from all others in any other important particular. We thus get a tolerably clear idea of what a natural class is. it will amply suffice for our present purpose; though we can hardly hope that it will turn out to be logically accurate. We also see that, when an object has been made with a pur-

pose, as is, of course, the case with the sciences, no classes can be more fundamental nor broader than those which are defined by the purpose. A purpose is an operative desire. Now a desire is always general, that is, it is always some *kind* of thing or event which is desired, at least, until the element of will, which is always exercised upon an individual object upon an individual occasion, becomes so predominant as to overrule the generalizing character of desire. Thus, desires create classes, and extremely broad classes. But desires become, in the pursuit of them, more specific. Let us revert, for example, to lamps. We desire, in the first instance, merely economical illumination. But we remark that that may be carried out by combustion, where there is a chemical process kindling itself, or heat may be supplied from without in electric lighting, or it may be stored up, as in phosphorescence. These three ways of carrying out our main purpose constitute subsidiary purposes.¹ So if we decide upon electric lighting, the question will be between incandescent and arc lighting. If we decide upon combustion, the burning matter may itself become incandescent, or its heat may serve to render another more suitable thing incandescent, as in the Welsbach burner. Here is a complication which will ordinarily be advantageous, since by not making the same thing fulfill the two functions of supplying heat to produce incandescence and of incandescing upon being heated, there is more freedom to choose things suitable to the two functions. This is a good example of that sort of natural class which Agassiz called an order, that is, a class created by a useful complication of a general plan.

206 Closely connected with the fact that every desire is general, are two other facts which must be taken into account in considering purposive classes. The first of these is that a desire is always more or less variable, or vague. For example, a man wants an economical lamp. Then if he burns oil in it, he will endeavor to burn that oil which gives him sufficient light at the lowest cost. But another man, who lives a little further from the source of supply of that oil and a little nearer the source of a different oil may find that different oil to be the

¹ I am here influenced by the *Essay on Classification* [1857] of L. Agassiz, whose pupil I was for a few months. This work appeared at a most inauspicious epoch.

better for him. So it is with the desires of one individual. The same man who prefers veal to pork as a general thing, may think that an occasional spare rib is better than having cold boiled veal every day of his life. In short, variety is the spice of life for the individual, and practically still more so for a large number of individuals, and as far as we can compare Nature's ways with ours, she seems to be even more given to variety than we. These three cases may be very different on their subjective side, but for purposes of classification they are equivalent.

207. But not only is desire *general* and *vague*, or indeterminate, it has besides a certain longitude, or *third* dimension. By this I mean that while a certain ideal state of things might most perfectly satisfy a desire, yet a situation somewhat differing from that will be far better than nothing, and in general, when a state is not too far from the ideal state, the nearer it approaches that state the better. Moreover, the situation of things most satisfactory to one desire is almost never the situation most satisfactory to another. A brighter lamp than that I use would perhaps be more agreeable to my eyes, but it would be less so to my pocket, to my lungs, and to my sense of heat. Accordingly, a compromise is struck, and since all the desires concerned are somewhat vague, the result is that the objects actually will cluster about certain middling qualities, some being removed this way, some that way, and at greater and greater removes fewer and fewer objects will be so determined. Thus, clustering distributions will characterize purposive classes.

208. One consequence of this deserves particular notice, since it will concern us a good deal in our classification of the sciences, and yet is quite usually overlooked and assumed not to be as it is. Namely, it follows that it may be quite impossible to draw a sharp line of demarcation between two classes, although they are real and natural classes in strictest truth. Namely, this will happen when the form about which the individuals of one class cluster is not so unlike the form about which individuals of another class cluster but that variations from each middling form may precisely agree. In such a case, we may know in regard to any intermediate form what proportion of the objects of that form had one purpose and what proportion the other, but unless we have some supplementary

information we cannot tell which ones had one purpose and which the other.

209. The reader may be disposed to suspect that this is merely a mathematician's fancy, and that no such case would be likely ever to occur. But he may be assured that such occurrences are far from being rare. In order to satisfy him that this state of things does occur, I will mention an incontestable instance of it,—incontestable, at least, by any fair mind competent to deal with the problem. Prof [W. M.] Flinders Petrie, whose reasoning powers I had admired long before his other great scientific qualities had been proved, among which his great exactitude and circumspection as a metrologist concerns us here, exhumed, at the ancient trading town of Naucratis, no less than 158 balance-weights having the Egyptian *ket* as their unit.¹ The great majority of them are of basalt and syenite, material so unchangeable that the corrections needed to bring them to their original values are small. I shall deal only with 144 of them from each of which Mr. Petrie has calculated the value of the *ket* to a tenth of a Troy grain. Since these values range all the way from 137 to 152 grains, it is evident that the weights were intended to be copies of several different standards, probably four or five, for there would be no use of a balance, if one could detect the errors of the balance-weights by simply "hefting" them, and comparing them with one's memory of the standard weight. Considering that these weights are small, and were therefore used for weighing costly or even precious matter, our knowledge of the practice of weighing among the ancients gives us ground for thinking it likely that about half the weights would depart from their virtual standards by more, and about half by less, than, say, four or five tenths of one per cent, which, upon a *ket*, would be from half to two-thirds of a grain. Now the whole interval here is fourteen and one-half grains; and between 136.8 grains to 151.3 grains there is no case of an interval of more than a third of a grain not represented by any weight among the 144. To a person thoroughly familiar with the theory of errors this shows that there must be four or five different standards to which different ones aim to conform. . . . In order to represent these observations, I have adopted the following rough-and-ready

¹ *Egyptian Exploration Fund*, Third Memoir, 1886.

theory; for to make elaborate calculations would, from every point of view, be a waste of time. I have assumed that there were five different standards, that the weights depart from their standards according to the probability curve; and that the probable error of a single weight is five-eighths of a grain. I assume that of the 144 weights

36 were designed to conform to a standard of 139 2 grs.

25 were designed to conform to a standard of 142.2 grs

26 were designed to conform to a standard of 144 7 grs.

23 were designed to conform to a standard of 146 95 grs.

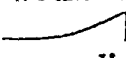
34 were designed to conform to a standard of 149 7 grs.



... I repeat that this theory has not been the subject of any but the simplest calculations. It is obvious that some such theory must be true; but to decide how near my theory probably comes to the true theory or how it ought to be modified, would be a very intricate problem for the solution of which the data are probably insufficient. It does not concern us here, our object being merely to make it clear that truly natural classes may, and undoubtedly often do merge into one another inextricably.

It is, I think, pretty certain that there were as many as five standards. Before the adoption of the metric system, every city throughout the greater part, if not all, the continent of Europe had its own pound, like its own *patois*. See the article "pound" in the *Century Dictionary*,* which was based on a list of some three hundred of such pounds whose values were known to me, a list now kept in manuscript in the Astor Library. That the same state of things must have been true in ancient Egypt may be inferred from the looseness of the tie which bound the different provinces of that empire together. Even their religions were different, so that *a fortiori* their *kets* would be so. Besides, none of the *kets* carry any authoritative mark, which is pretty conclusive proof that the central government did not intervene. It is, therefore, probable that the five standards were those of five towns with which Naucratis carried on trade. Yet virtual standards may be created in other ways. For example, where government does not insure uniformity in weights, it is usual for buyers to bring their own weights. It would thus naturally happen that some balance-

* p 4657, edition of 1889

weights would be manufactured for the use of buyers, and others for the use of sellers, and thus there would naturally be a tendency to the crystallization of a heavier and a lighter norm

210. As for my assumption that the departures of the single weights from their virtual standards conform to the probability curve, it was only adopted as a ready way of imparting definiteness to the problem. Rich as is the store of data given by Petrie, it is insufficient, apparently, for determining the true law of those departures. If the workmen were sufficiently skillful (as I believe they would be) the departures would follow the probability curve. But if they were unskillful, it would be desirable to ascertain by what process the weights were made. The weights, being of stone, are not loaded, so that the adjustment was made by grinding, exclusively. Did the workman, then, have a balance by his side, or did he finish the weight by guesswork? In the latter case, inspection (and some sort of inspection there must, in this case, have been) would reject all weights outside a certain "tolerance," as it is called in coinage. Those that were too light would have to be thrown away. They would lie in a heap, until they reappeared to deceive a future archeologist. Petrie's weights, however, are somewhat heavier, not lighter, than independent evidence would lead us to believe the *ket* to have been. Those that were too heavy would be reground, but would for the most part still be rather heavier than the standard. The consequence would be that the [error] curve would be cut down vertically at two ordinates (equally distant, perhaps, from the standard), while the ordinate of its maximum would be at the right of that of the standard. If the workman had a balance at hand, and frequently used it during the process of adjustment, the form of the error-curve would depend upon the construction of the balance. If it were like a modern balance, so as to show, not only that one mass is greater than another, but also whether it is much or little greater, the workman would keep in one pan a weight of the maximum value that he proposed to himself as permissible for the weight he was making; and in all his successive grindings would be aiming at that. The consequence would be a curve  concave upwards and stopping abruptly at its maximum ordinate: a form easily

manageable by a slight modification of the method of least squares. But most of the balances shown upon the Egyptian monuments are provided with stops or other contrivances which would be needless if the balances were not top-heavy. Such balances, working automatically, are in use in all the mints of the civilized world, for throwing out light and heavy coins. Now a top-heavy balance will not show that two weights are equal, otherwise than by remaining with either end down which may be down. It only shows when, a weight being already in one pan, a decidedly heavier weight is placed in the other. The workman using such a balance would have no warning that he was approaching the limit, and would be unable to aim at any definite value, but (being, as we are supposing, devoid of skill), would have to grind away blindly, trying his weight every time he had ground off about as much as the whole range of variation which he proposed to allow himself. If he always ground off precisely the same amounts between successive tryings of his weight, he would be just as likely to grind below his maximum by any one fraction of the amount taken off at a grinding as by any other; so that his error curve would be a horizontal line cut off by vertical ordinates, thus, . But since there would be a variability in the amount taken off between the trials, the curve would show a contrary flexure; thus, . It must be admitted that the distribution of Petrie's *kets* is suggestive of this sort of curve, or rather of a modification of it due to a middling degree of skill.

211. I hope this long digression (which will be referred to with some interest when we come to study the theory of errors) will not have caused the reader to forget that we were engaged in tracing out some of the consequences of understanding the term "natural," or "real," class to mean a class the existence of whose members is due to a common and peculiar final cause. It is, as I was saying, a widespread error to think that a "final cause" is necessarily a purpose. A purpose is merely that form of final cause which is most familiar to our experience. The signification of the phrase "final cause" must be determined by its use in the statement of Aristotle* that all

* See *Meta.* 44 b 1 and 70 b 26.

causation divides into two grand branches, the efficient, or forceful, and the ideal, or final. If we are to conserve the truth of that statement, we must understand by final causation that mode of bringing facts about according to which a general description of result is made to come about, quite irrespective of any compulsion for it to come about in this or that particular way, although the means may be adapted to the end. The general result may be brought about at one time in one way, and at another time in another way. Final causation does not determine in what particular way it is to be brought about, but only that the result shall have a certain general character.

212. Efficient causation, on the other hand, is a compulsion determined by the particular condition of things, and is a compulsion acting to make that situation begin to change in a perfectly determinate way, and what the general character of the result may be in no way concerns the efficient causation. For example, I shoot at an eagle on the wing, and since my purpose — a special sort of final, or ideal, cause — is to hit the bird, I do not shoot directly at it, but a little ahead of it, making allowance for the change of place by the time the bullet gets to that distance. So far, it is an affair of final causation. But after the bullet leaves the rifle, the affair is turned over to the stupid efficient causation, and should the eagle make a swoop in another direction, the bullet does not swerve in the least, efficient causation having no regard whatsoever for results, but simply obeying orders blindly. It is true that the force of the bullet conforms to a law, and the law is something general. But for that very reason the law is not a force. For force is compulsion; and compulsion is *hic et nunc*. It is either that or it is no compulsion. Law, without force to carry it out, would be a court without a sheriff, and all its dicta would be vaporings. Thus, the relation of law, as a cause, to the action of force, as its effect, is final, or ideal, causation, not efficient causation. The relation is somewhat similar to that of my pulling the hair trigger of my rifle, when the cartridge explodes with a force of its own, and off goes the bullet in blind obedience to perform the special instantaneous beginning of an act that it is, each instant, compelled to commence. It is a vehicle of compulsion *hic et nunc*, receiving and transmitting it, while I receive and transmit ideal influence, of which I am a vehicle.

213. When we speak of an "idea," or "notion," or "conception of the mind," we are most usually thinking — or trying to think — of an idea abstracted from all efficiency. But a court without a sheriff, or the means of creating one, would not be a court at all, and did it ever occur to you, my reader, that an idea without efficiency is something equally absurd and unthinkable? Imagine such an idea if you can! Have you done so? Well, where did you get this idea? If it was communicated to you *viva voce* from another person, it must have had efficiency enough to get the particles of air vibrating. If you read it in a newspaper, it had set a monstrous printing press in motion. If you thought it out yourself, it had caused something to happen in your brain. And again, how do you know that you did have the idea when this discussion began a few lines above, unless it had efficiency to make some record on the brain? The court cannot be imagined without a sheriff. Final causality cannot be imagined without efficient causality, but no whit the less on that account are their modes of action polar contraries. The sheriff would still have his fist, even if there were no court, but an efficient cause, detached from a final cause in the form of a law, would not even possess efficiency. It might exert itself, and something might follow *post hoc*, but not *propter hoc*; for *propter* implies potential regularity. Now without law there is no regularity, and without the influence of ideas there is no potentiality.

214. The light of these reflections brings out into distinct view characters of our definition of a real class which we might otherwise have overlooked or misinterpreted. Every class has its definition, which is an idea, but it is not every class where the *existence*, that is, the occurrence in the universe of its members is due to the active causality of the defining idea of the class. That circumstance makes the epithet *natural* particularly appropriate to the class. The word *natura* evidently must originally have meant *birth*; although even in the oldest Latin it very seldom bears that meaning. There is, however, a certain sub-conscious memory of that meaning in many phrases; just as with words from *φύσις*, there is the idea of springing forth, or a more vegetable-like production, without so much reference to a progenitor. Things, it may be, *φύεται* spontaneously; but *nature* is an inheritance.

215. Heredity, of which so much has been said since 1860, is not a force but a law, although, like other laws, it doubtless avails itself of forces. But it is essentially that the offspring shall have a *general* resemblance to the parent, not that this general resemblance happens to result from this or that blind and particular action. No doubt, there is some blind efficient causation; but it is not that which constitutes the heredity, but, on the contrary, the general resemblance.

216. So, then, those naturalists are right who hold that the action of evolution in reproduction produces *real* classes, as by the very force of the words it produces *natural* classes. In considering the classification of sciences, however, we have no need of penetrating the mysteries of biological development; for the generation here is of ideas by ideas — unless one is to say, with many logicians, that ideas arise from the consideration of facts in which there are no such ideas, nor any ideas. That opinion is a superficial one, allied, on one side of it, to the notion that the only final cause is a purpose. So, those logicians imagine that an idea has to be connected with a brain, or has to inhere in a "soul." This is preposterous: the idea does not belong to the soul; it is the soul that belongs to the idea. The soul does for the idea just what the cellulose does for the beauty of the rose: that is to say, it affords it opportunity. It is the court-sheriff, the arm of the law.

217. I fear I may be producing the impression of talking at random. It is that I wish the reader to "catch on" to my conception, my point of view; and just as one cannot make a man see that a thing is red, or is beautiful, or is touching, by describing redness, beauty, or pathos, but can only point to something else that is red, beautiful, or pathetic, and say, "Look here too for something like that there," so if the reader has not been in the habit of conceiving ideas as I conceive them, I can only cast a sort of dragnet into his experience and hope that it may fish up some instance in which he shall have had a similar conception. Do you think, reader, that it is a positive fact that

"Truth, crushed to earth, shall rise again,"

or do you think that this, being poetry, is only a pretty fiction? Do you think that, notwithstanding the horrible wickedness of every mortal wight, the idea of right and wrong is nevertheless

the greatest power on this earth, to which every knee must sooner or later bow or be broken down, or do you think that this is another notion at which common sense should smile? Even if you are of the negative opinion, still you must acknowledge that the affirmative is intelligible. Here, then, are two instances of ideas which either have, or are believed to have, life, the power of bringing things to pass, here below. Perhaps you may object that right and wrong are only a power because there are, or will be, powerful men who are disposed to make them so, just as they might take it into their heads to make tulip-fancying, or freemasonry, or Volapuk a power. But you must acknowledge that this is not the position of those on the affirmative side. On the contrary, they hold that it is the idea which will create its defenders, and render them powerful. They will say that if it be that freemasonry or its foe, the Papacy, ever pass away — as perhaps either may — it will be precisely because they are ideas devoid of inherent, incorruptible vitality, and not at all because they have been unsupplied with stalwart defenders. Thus, whether you accept the opinion or not, you must see that it is a perfectly intelligible opinion that ideas are not all mere creations of this or that mind, but on the contrary have a power of finding or creating their vehicles, and having found them, of conferring upon them the ability to transform the face of the earth.

218. If you ask what mode of being is supposed to belong to an idea that is in no mind, the reply will come that undoubtedly the idea must be embodied (or ensouled—it is all one) in order to attain complete being, and that if, at any moment, it should happen that an idea — say that of physical decency — was quite unconceived by any living being, then its mode of being (supposing that it was not altogether dead) would consist precisely in this, namely, that it was about to receive embodiment (or ensoulment) and to work in the world. This would be a mere potential being, a being *in futuro*, but it would not be the utter nothingness which would befall matter (or spirit) if it were to be deprived of the governance of ideas, and thus were to have no regularity in its action, so that throughout no fraction of a second could it steadily act in any general way. For matter would thus not only not actually exist, but it would not have even a potential existence, since potentiality

is an affair of ideas. It would be just downright Nothing.

219. It so happens that I myself believe in the eternal life of the ideas Truth and Right. I need not, however, insist upon that for my present purpose, and have only spoken of them in order to make my meaning clear. What I do insist upon is not now the infinite vitality of those particular ideas, but that every idea has in some measure, in the same sense that those are supposed to have it in unlimited measure, the power to work out physical and psychical results. They have life, generative life.

That it is so is a matter of experiential fact. But whether it is so or not is not a question to be settled by producing a microscope or telescope or any recondite observations of any kind. Its evidence stares us all in the face every hour of our lives. Nor is any ingenious reasoning needed to make it plain. If one does not see it, it is for the same reason that some men have not a sense of sin, and there is nothing for it but to be born again and become as a little child. If you do not see it, you have to look upon the world with new eyes.

220. I may be asked what I mean by the objects of [a] class *deriving their existence* from an idea. Do I mean that the idea calls new matter into existence? Certainly not. That would be pure intellectualism, which denies that blind force is an element of experience distinct from rationality, or logical force. I believe that to be a great error, but I need not stop to disprove it now, for those who entertain it will be on my side in regard to classification. But it will be urged that if that is not my meaning, then the idea merely confers upon the members of the class its character, and since every class has a defining character, any one class is as "natural" or "real" as another, if that term be taken in the sense I give to it. I cannot, however, quite admit that. Whether or not every class is or is not more or less a natural class is a question which may be worth consideration; but I do not think that the relation of the idea to the members of the natural class is simply that it is applicable to them as a predicate, as it is to every class equally. What I mean by the idea's conferring existence upon the individual members of the class is that it confers upon them the power of working out results in this world. ⁺ it confers upon them, that is to say, organic existence. **one word,** life. The existence of an individual man **dis-** thing from

the existence of the matter which at any given instant happens to compose him, and which is incessantly passing in and out. A man is a wave, but not a vortex. Even the existence of the vortex, though it does happen to contain, while it lasts, always the same particles, is a very different thing from the existence of these particles. Neither does the existence of wave or vortex consist merely in the fact that something is true of whatever particles compose them, although it is inseparably bound up with that fact. Let me not be understood as proposing any new definitions of a vortex and a wave. What I mean is this. Take a corpse, dissect it, more perfectly than it ever was dissected. Take out the whole system of blood vessels entire, as we see them figured in the books. Treat the whole systems of spinal and sympathetic nerves, the alimentary canal with its adjuvants, the muscular system, the osseous system, in the same way. Hang these all in a cabinet so that from a certain point of view each appears superposed over the others in its proper place. That would be a singularly instructive specimen. But to call it a man would be what nobody would for an instant do or dream. Now the best definition that ever was framed is, at best, but a similar dissection. It will not really work in the world as the object defined will. It will enable us to see how the thing works, in so far as it shows the efficient causation. The final causation, which is what characterizes the *definitum*, it leaves out of account. We make smoke rings. We make one pass through another, and perform various experiments, which give us an imperfect idea, yet some idea, of what a vortex really is. *How* all these things happen can be traced out from the definition. But the *rôle* that vortices really play in the universe — no insignificant one, if all matter is built of them — the real life of them, depends upon the idea of them, which simply finds its opportunity in those circumstances that are enumerated in the definition. Efficient causation is that kind of causation whereby the parts compose the whole, final causation is that kind of causation whereby the whole calls out its parts. Final causation without efficient causation is helpless, mere calling for parts is what a Hotspur, or any man, may do, but they will not come without efficient causation. Efficient causation without final causation, however, is worse than helpless, by far, it is mere chaos, and

chaos is not even so much as chaos, without final causation, it is blank nothing

221. The writer of a book can do nothing but set down the items of his thought. For the living thought, itself, in its entirety, the reader has to dig into his own soul. I think I have done my part, as well as I can. I am sorry to have left the reader an irksome chore before him. But he will find it worth the doing.

222. So then, a natural class being a family whose members are the sole offspring and vehicles of one idea, from which they derive their peculiar faculty, to classify by abstract definitions is simply a sure means of avoiding a natural classification. I am not decrying definitions. I have a lively sense of their great value in science. I only say that it should not be by means of definitions that one should seek to find natural classes. When the classes have been found, then it is proper to try to define them; and one may even, with great caution and reserve, allow the definitions to lead us to turn back and see whether our classes ought not to have their boundaries differently drawn. After all, boundary lines in some cases can only be artificial, although the classes are natural, as we saw in the case of the *kets*. When one can lay one's finger upon the purpose to which a class of things owes its origin, then indeed abstract definition may formulate that purpose. But when one cannot do that, but one can trace the genesis of a class and ascertain how several have been derived by different lines of descent from one less specialized form, this is the best route toward an understanding of what the natural classes are. This is true even in biology; it is much more clearly so when the objects generated are, like sciences, themselves of the nature of ideas.

223. There are cases where we are quite in the dark, alike concerning the creating purpose and concerning the genesis of things, but [there are cases] where we find a system of classes connected with a system of abstract ideas — most frequently numbers — and that in such a manner as to give us reason to guess that those ideas in some way, usually obscure, determine the possibilities of the things. For example, chemical compounds, generally — or at least the more decidedly characterized of them, including, it would seem, the so-called elements — seem to belong to types, so that, to take a single example,

chlorates KClO_3 , manganates* KMnO_3 , bromates KBrO_3 , rutheniates† KRuO_3 , iodates KIO_3 , behave chemically in strikingly analogous ways. That this sort of argument for the existence of natural classes — I mean the argument drawn from types, that is, from a connection between the things and a system of formal ideas — may be much stronger and more direct than one might expect to find it, is shown by the circumstance that ideas themselves — and are they not the easiest of all things to classify naturally, with assured truth? — can be classified on no other grounds than this, except in a few exceptional cases. Even in these few cases, this method would seem to be the safest. For example, in pure mathematics, almost all the classification reposes on the relations of the forms classified to numbers or other multitudes. Thus, in topical geometry, figures are classified according to the whole numbers attached to their *choresis*, *cyclosis*, *periphraxis*, *apeiresis*, etc. As for the exceptions, such as the classes of hessians, jacobians, invariants, vectors, etc., they all depend upon types, too, although upon types of a different kind. It is plain that it must be so, and all the natural classes of logic will be found to have the same character.

§2 NATURAL CLASSIFICATIONS

224 There are two remarks more about natural classification which, though they are commonplace enough, cannot decently be passed by without recognition. They have both just been virtually said, but they had better be more explicitly expressed and put in a light in which their bearing upon the practice of classification shall be plain. The descriptive definition of a natural class, according to what I have been saying, is not the essence of it. It is only an enumeration of tests by which the class may be recognized in any one of its members. A description of a natural class must be founded upon samples of it or typical examples. Possibly a zoologist or a botanist may have so definite a conception of what a species is that a single type-specimen may enable him to say whether a form of which he finds a specimen belongs to the same species or not. But it will be much safer to have a large number of individual

* K_2MnO_4

† K_2RuO_4

specimens before him, from which he may get an idea of the amount and kind of individual or geographical variation to which the given species is subject. In proportion as the category of the class is higher, the greater will be the need of a multiplicity of examples. True, a naturalist may be so familiar with what a genus is, what a family is, what an order is, what a class is, that if you were to show him a new specimen of a hitherto unknown class, he could, with that single specimen before him, sit down and write out definitions, not only of its class, but also of its order, of its family, and of its genus, as well as of its species. Such a feat would display marvellous familiarity with what those categories [mean] in botany and in zoology, but intellectually it would be a performance of no high order, and the less so the greater the certainty of the conclusion. Generalization broad, luminous, and solid must enter into an intellectual performance in order to command much admiration. Such generalization, which teaches a new and clear lesson upon the truth of which reliance can be placed, requires to be drawn from many specimens. We shall endeavor, in that way, to define each class, that is to enumerate characters which are absolutely decisive as to whether a given individual does or does not belong to the class. But it may be, as our *kets* show, that this is altogether out of the question; and the fact that two classes merge is no proof that they are not truly distinct natural classes.

225 For they may, nevertheless, be genealogically distinct, just as no degree of resemblance between two men is proof positive that they are brothers. Now genealogical classification, among those objects of which the genesis is genealogical, is the classification we can most certainly rely upon as being natural. No harm will be done if, in those cases, we *define* the natural classification as the genealogical classification, or, at least, [if] we make the genealogical character one of the essential characters of a natural classification. It can not be more; because if we had before us, ranged in ancestral order, all the intermediate forms through which the human stock has passed in developing from non-man into man, it is plain that other considerations would be necessary in determining (if it admitted of determination) at what point in the series the forms begin to merit the name of human.

226. The sciences are, in part, produced each from others. Thus, spectroscopic astronomy has for its parents, astronomy, chemistry, and optics. But this is not the whole genesis nor the principal part of the genesis of any broad and definite science. It has its own peculiar problem springing from an idea. That geometry derived its birth from land surveying is the tradition, which is borne out by the tradition that it took its origin in Egypt where the yearly floods must have rendered accurate surveying of special importance. Moreover, the wonderful accuracy of the dimensions of the great pyramid exhibit a degree of skill in laying out ground which could only have been attained by great intellectual activity, and this activity could hardly fail to lead to some beginnings of geometry. We may, therefore, accept with considerable confidence the tradition involved in the very name of geometry. Speaking in a broad, rough way, it may be said that the sciences have grown out of the useful arts, or out of arts supposed to be useful. Astronomy out of astrology, physiology, taking medicine as a halfway out of magic, chemistry out of alchemy, thermotics from the steam-engine, etc. Among the theoretical sciences, while some of the most abstract have sprung straight from the concretest arts, there is nevertheless a well-marked tendency for a science to be first descriptive, later classificatory, and lastly to embrace all classes in one law. The classificatory stage may be skipped. Yet in the truer order of development, the generation proceeds quite in the other direction. Men may and do begin to study the different kinds of animals and plants before they know anything of the general laws of physiology. But they cannot attain any true understanding of taxonomic biology until they can be guided by the discoveries of the physiologists. Till then the study of mollusks will be nothing but conchology. On the other hand the physiologist may be aided by a fact or two here and there drawn from taxonomic biology, but he asks but little and that little not very urgently of anything that the taxonomist can tell him and that he could not find out for himself.

227. All natural classification is then essentially, we may almost say, an attempt to find out the true genesis of the objects classified. But by genesis must be understood, not the efficient action which produces the whole by producing the

parts, but the final action which produces the parts because they are needed to make the whole. Genesis is production from ideas. It may be difficult to understand how this is true in the biological world, though there is proof enough that it is so. But in regard to science it is a proposition easily enough intelligible. A science is defined by its problem; and its problem is clearly formulated on the basis of abstracter science. This is all I intended to say here concerning classification, in general.

228. Having found the natural classes of the objects to be classified, we shall then use the same methods — probably, in most cases, the third — in order to discover the natural classes of those classes that we have found. Is this the whole business of classification? No serious student can hold it to be so. The classes found have to be defined, naturally if possible, but if not, then at least conveniently for the purposes of science. They have not only to be defined but described, a story without an end. This applies, of course, not merely to the species or immediate classes of the objects described, but to the higher orders of classes. There may also be between the different classes relations, each of which appertains just as much to the description of any one of the set of classes to which it belongs as to any other.

229. In regard to the higher orders of classes, so far as concerns animals, Louis Agassiz* thought that he was able to characterize in general terms the different categories of classes which zoologists talk of. That is, he undertook to say what sort of characters distinguish *branches* from branches, *classes* from classes, *orders* from orders, *families* from families, *genera* from genera, and *species* from species. His general classification of animals has passed away, and few naturalists attach much importance to his characterizations of the categories. Yet they are the outcome of deep study, and it is a merit of them that they involve no attempt at hard abstract accuracy of statement. How can he have been so long immersed in the study of nature without some truth sticking to him? I will just set down his vague definitions and allow myself to be vaguely influenced by them, so far as I find anything in the facts that answers to his descriptions. Although I am an ignoramus in biology, I ought by this time to recognize meta-

* In the *Essay on Classification*.

physics when I meet with it, and it is apparent to me that those biologists whose views of classification are most opposite to those of Agassiz are saturated with metaphysics in its dangerous form — *i e* the unconscious form — to such an extent that what they say upon this subject is rather the expression of a traditionally absorbed fourteenth century metaphysics than of scientific observation.

230 It would be useless for our purpose to copy the definitions of Agassiz¹ had he not expressed them in the briefest terms, as follows

Branches are characterized by the plan of structure;

Classes, by the manner in which that plan is executed, as far as ways and means are concerned, ("Structure is the watch-word for the recognition of classes" Page 145)

Orders, by the degrees of complication of that structure, ("The leading idea . . . is that of a definite rank among them" Page 151)

Families, by their form, as determined by structure, ("When we see new animals, does not the first glance, that is, the first impression made upon us by their form, give us a very correct idea of their nearest relationship? . . . So form is characteristic of families, . . . I do not mean the mere outline, but form as determined by structure" Pages 159, 160)

Genera, by the details of the execution in special parts,

Species, by the relations of individuals to one another and to the world in which they live, as well as by the proportions of their parts, their ornamentation, etc

231 All classification, whether artificial or natural, is the arrangement of objects according to ideas. A natural classification is the arrangement of them according to those ideas from which their existence results. No greater merit can a taxonomist have than that of having his eyes open to the ideas in nature, no more deplorable blindness can afflict him than that of not seeing that there are ideas in nature which determine the existence of objects. The definitions of Agassiz will, at least, do us the service of directing our attention to the supreme importance of bearing in mind the final cause of objects in finding out their own natural classifications

¹ Ib, quarto 1857, p 170. The reader will perceive by the date that these ideas were put forth at a somewhat inauspicious moment.

§3. THE ESSENCE OF SCIENCE

232. So much in regard to classification. Now if we are to classify the sciences, it is highly desirable that we should begin with a definite notion of what we mean by a science, and in view of what has been said of natural classification, it is plainly important that our notion of science should be a notion of science as it lives and not a mere abstract definition. Let us remember that science is a pursuit of living men, and that its most marked characteristic is that when it is genuine, it is in an incessant state of metabolism and growth. If we resort to a dictionary, we shall be told that it is systematized knowledge. Most of the classifications of the sciences have been classifications of systematized and established knowledge — which is nothing but the exudation of living science, — as if plants were to be classified according to the characters of their gums. Some of the classifications do even worse than that, by taking science in the sense attached by the ancient Greeks, especially Aristotle, to the word *ἐπιστήμη*. A person can take no right view of the relation of ancient to modern science unless he clearly apprehends the difference between what the Greeks meant by *ἐπιστήμη* and what we mean by knowledge. The best translation of *ἐπιστήμη* is “comprehension.” It is the ability to define a thing in such a manner that all its properties shall be corollaries from its definition. Now it may be that we shall ultimately be able to do that, say for light or electricity. On the other hand, it may equally turn out that it forever remains as impossible as it certainly is to define number in such a way that Fermat’s and Wilson’s theorems should be simple corollaries from the definition. I do not mean to deny that those theorems are deducible from the definition. All that is here being urged turns on the falsity of the old notion that all deduction is corollarial deduction. But, at any rate, the Greek conception of knowledge was all wrong in that they thought that one must advance in direct attack upon this *ἐπιστήμη*; and attached little value to any knowledge that did not manifestly tend to that. To look upon science in that point of view in one’s classification is to throw modern science into confusion.

233. Another fault of many classifications — or if not a fault, it is at least a purpose very different from that which I

should be bold enough to attempt — is that they are classifications not of science as it exists, but of systematized knowledge such as the classifier hopes may some time exist. I do not believe it is possible to have that intimate acquaintance with the science of the indefinite future that the discovery of the real and natural classification of it would require. At any rate, I will make no such attempt, except in one department, and there only partially and timidly.

234 Let us look upon science — the science of today — as a living thing. What characterizes it generally, from this point of view, is that the thoroughly established truths are labelled and put upon the shelves of each scientist's mind, where they can be at hand when there is occasion to use things — arranged, *therefore, to suit his special convenience* — while science itself, the living process, is busied mainly with conjectures, which are either getting framed or getting tested. "When that systematized knowledge on the shelves is used, it is used almost exactly as a manufacturer or practising physician might use it, that is to say, it is merely applied. If it ever becomes the object of science, it is because in the advance of science, the moment has come when it must undergo a process of purification or of transformation.

235 A scientific man is likely in the course of a long life to pick up a pretty extensive acquaintance with the results of science, but in many branches, this is so little necessary that one will meet with men of the most deserved renown in science who will tell you that, beyond their own little nooks, they hardly know anything of what others have done. Sylvester always used to say that he knew very little mathematics true, he seemed to know more than he thought he did. In various branches of science, some of the most eminent men first took up those subjects as mere pastimes, knowing little or nothing of the accumulations of knowledge. So it was with the astronomer Lockyer — so it has been with many naturalists. Now, did those men gradually become men of science as their stores of knowledge increased, or was there an epoch in their lives, before which they were amateurs and after which they were scientists? I believe that the answer is that, like any other regeneration, the metamorphosis is commonly sudden, though sometimes slow. When it is sudden, what is it that cons,

the transformation? It is their being seized with a great desire to learn the truth, and their going to work with all their might by a well-considered method to gratify that desire. The man who is working in the right way to learn something not already known is recognized by all men of science as one of themselves, no matter how little he is informed. It would be monstrous to say that Ptolemy, Archimedes, Eratosthenes and Posidonius were not scientific men because their knowledge was comparatively small. The life of science is in the desire to learn. If this desire is not pure, but is mingled with a desire to prove the truth of a definite opinion, or of a general mode of conceiving of things, it will almost inevitably lead to the adoption of a faulty method, and *in so far* such men, among whom many have been looked upon in their day as great lights, are not genuine men of science; though it would be foul injustice to exclude them absolutely from that class. So if a man pursues a futile method through neglect to inform himself of effective methods, he is no scientific man, he has not been moved by an intelligently sincere and effective desire to learn. But if a man simply fails to inform himself of previous work which would have facilitated his own, although he is to blame, it would be too harsh to say that he has violated the essential principles of science. If a man pursues a method which, though very bad, is the best that the state of intellectual development of his time, or the state of the particular science he pursues, would enable a man to take — I mean, for example, such men as Lavater, Paracelsus and the earlier alchemists, the author of the first chapter of Genesis, and the old metaphysicians — we perhaps cannot call them scientific men, while perhaps we ought to do so. Opinions would differ about this. They are, at any rate, entitled to an honorable place in the vestibule of science. A pretty wild play of the imagination is, it cannot be doubted, an inevitable and probably even a useful prelude to science proper. For my part, if these men really had an effective rage to learn the very truth, and did what they did as the best way they knew, or could know, to find it out, I could not bring myself to deny them the title. The difficulty is that one of the things that coheres to that undeveloped state of intelligence is precisely a very imperfect and impure thirst for truth. Paracelsus and the alchemists were rank charlatans seeking for gold

more than for truth. The metaphysicians were not only pedants and pretenders, but they were trying to establish foregone conclusions. These are the traits which deprive those men of the title scientist, although we ought to entertain a high respect for them as mortals go, because they could no more escape the corruptness of their aims than they could the deficiencies of their knowledge. Science consists in actually drawing the bow upon truth with intentness in the eye, with energy in the arm.

236. Such being the essence of science, it is obvious that its first offspring will be men — men whose whole lives are devoted to it. By such devotion each of them acquires a training in making some particular kind of observations and experiments. (Unfortunately, his acquisition of books, instruments, laboratory, etc., depends upon qualifications in which the man of science is usually rather wanting — as wealth, diplomacy, popularity as a teacher — so that he is less likely to be provided with them than are men less qualified to use them for the advancement of science.) He will thus live in quite a different world — quite a different aggregate of experience — from unscientific men and even from scientific men pursuing other lines of work than his. He naturally converses with and reads the writings of those who, having the same experience, have ideas interpretable into his own. This society develops conceptions of its own. Bring together two men from widely different departments — say a bacteriologist and astronomer — and they will hardly know what to say to one another, for neither has seen the world in which the other lives. True, both use optical instruments, but the qualities striven for in a telescopic objective are of no consequence in a microscopical objective, and all the subsidiary parts of telescope and microscope are constructed on principles utterly foreign to one another — except their stiffness.

237. Here, then, are natural classes of sciences all sorted out for us in nature itself, so long as we limit our classification to actually recognized sciences. We have only to look over the list of scientific periodicals and the list of scientific societies to find the families of science, ready named. I call such classes families because Agassiz tells us that it is the family which strikes the observer at first glance. To make out the genera

and especially the species, closer examination is requisite; while the knowledge of orders, classes, and branches calls for a broader acquaintance with science.

§4. THE DIVISIONS OF SCIENCE

238 The first great division of science will be according to its fundamental purpose, making what I shall term *branches* of science. A modification of a general purpose may constitute a *subbranch*. All knowledge whatever comes from observation; but different sciences are observational in such radically different ways that the kind of information derived from the observation of one department of science (say natural history) could not possibly afford the information required of observation by another branch (say mathematics). I call groups based on such considerations *classes*, and modifications of the same nature *subclasses*. Observation is, in Agassiz's phrase, the "ways and means" of attaining the purpose of science. Of two departments of science *A* and *B*, of the same class, *A* may derive special facts from *B* for further generalization while supplying *B* with principles which the latter, not aiming so high, is glad to find ready-made. *A* will rank higher than *B*, by virtue of the greater generality of its object, while *B* will be richer and more varied than *A*. I call groups based on these considerations *orders*, or if based on modifications of the same sort of idea, *suborders*. A given science with a special name, a special journal, a special society, studying one group of facts, whose students understand one another in a general way and naturally associate together, forms what I call a *family*. A subdivision of it on the same principle, but taken more minutely, I term a *subfamily*. I can give no such definitions of genera and species, not having carried my classification of the sciences to these minutiae. For it is to be understood that I have not first fixed my definitions of *branch*, *class*, *order*, and *family*, and then adapted the classification to those definitions, but, on the contrary, the classification was first entirely formed (except that the categories of subbranches, subclasses, and suborders had, in some cases, not been interposed, and in others had been confounded with the classes above them) before any idea of employing the terms *branch*, *class*, *order*, and *family* entered my head, and it was not until this was done that first the appropri-

ateness of these terms struck me. I can, however, say with some confidence that I should not regard a family as constituted merely by the class of facts studied, were there no concomitant difference of procedure, giving an all-round peculiar character to the study of that subject, nor do I believe that a mere difference in the things studied could appear to me a sufficient foundation for a difference between genera. Since writing that sentence, I notice that I have made inorganic and organic chemistry *subgenera*. But, then, everybody knows that there is far more difference between inorganic and organic chemistry than that the latter studies the compounds of a somewhat peculiar element. Their whole aims and ways of thinking, as well as their manipulation, are in distinct contrast.

239 I recognize two branches of science. Theoretical, whose purpose is simply and solely knowledge of God's truth, and Practical, for the uses of life. In Branch I, I recognize two subbranches, of which, at present, I consider only the first, [the sciences of discovery]. Among the theoretical sciences [of discovery], I distinguish three classes, all resting upon observation, but being observational in very different senses.¹

240. The first is mathematics, which does not undertake to ascertain any matter of fact whatever, but merely posits hypotheses, and traces out their consequences. It is observational, in so far as it makes constructions in the imagination according to abstract precepts, and then observes these imaginary objects, finding in them relations of parts not specified in the precept of construction. This is truly observation, yet certainly in a very peculiar sense, and no other kind of observation would at all answer the purpose of mathematics.²

¹ Some catholic writers recognize sciences resting upon authority. No doubt, everybody of good sense believes some things substantially because he has been brought up to do so, but according to my conception of what science is, *that* is not science. Indeed, belief proper has nothing to do with science. [Baldassare] Lablanca [*Dialettica*, vol. II, lib. IV, c. 1, 1875] admits a class of documentary sciences. This is more plausible, although, as that author admits, documentary evidence enters into every science, while nothing can have rested wholly on documentary evidence *to the original authors of the documents*. He reckons as documentary sciences, history, linguistics, political economy, statistics, and geography. But it is quite plain that these do not form a natural group, especially since this geography must include physical geography.

² Many writers of France (as Comte and Ribot), and of Germany (as Wundt), and a few in England (as Cave), have given

whit the worse physiognosist for being utterly blind to facts of mind, and if we sometimes find observation in a psychognosist, it will, unless by exception, be found not to be of a purely physical fact. Thus, a philologist may have a fine ear for language-sounds; but it is by no means pure physical resemblance which determines whether a given sound is or is not "the" Italian close *o*, for example, as it is naïvely called: it is psychical habit. In any simple physical sense the sounds not distinguished from that differ much more from one another than almost any of them do from sounds which would not be tolerated for "the" close *o*. So, this fine phonetic observation of the linguist is a knack of understanding a virtual convention. The two kinds of observation are different, but they do not seem to be quite so different as both alike are from the observation of the philosopher and the mathematician, and this is why, though I, at first, was inclined to give each of them equal rank with those classes, it has at length appeared certain that they should be placed a little lower.

243. I still persist in leaving unnoticed a certain sub-branch of theoretical science [the sciences of review], and as for the practical sciences,¹ I shall merely mention a few of them, just to give an idea of what I refer to under that name. I mean, then, all such well-recognized sciences now *in actu*, as pedagogics, gold-beating, etiquette, pigeon-fancying, vulgar arithmetic, horology, surveying, navigation, telegraphy, printing, bookbinding, paper-making, deciphering, ink-making, librarian's work, engraving, etc.* In short, this is by far the more various of the two branches of science. I must confess to being utterly bewildered by its motley crowd, but fortunately the natural classification of this branch will not concern us in logic — at least, will not do so as far as I can perceive.

244. Now let us consider the relations of the classes of science to one another. We have already remarked that rela-

¹ Some writers so little comprehend the motives of science that they imagine all sciences are directed to practical ends, as was the general understanding before the Nineteenth Century. Thus [Luigi] Ferrarese in 1828 [in his *Saggio di una nuova classificazione delle scienze*] divided all sciences into three groups according as their purpose is to maintain health, to further perfectionment, or to prevent degradation, the first and third being separated by a thin partition indeed.

* The editors have abbreviated a very long list.

tions of generation must always be of the highest concern to natural classification, which is, in fact, no more nor less than an account of the existential, or *natural*, birth concerning relations of things, meaning by birth the relations of a thing to its originating final causes.

245. Beginning with Class I, mathematics meddles with every other science without exception. There is no science whatever to which is not attached an application of mathematics. This is not true of any other science, since pure mathematics has not, as a part of it, any application of any other science, inasmuch as every other science is limited to finding out what is positively true, either as an individual fact, as a class, or as a law, while pure mathematics has no interest in whether a proposition is existentially true or not. In particular, mathematics has such a close intimacy with one of the classes of philosophy, that is, with logic, that no small acumen is required to find the joint between them.

246. Next, passing to Class II, philosophy, whose business it is to find out all that can be found out from those universal experiences which confront every man in every waking hour of his life, must necessarily have its application in every other science. For be this science of philosophy that is founded on those universal phenomena as small as you please, as long as it amounts to anything at all, it is evident that every special science ought to take that little into account before it begins work with its microscope, or telescope, or whatever special means of ascertaining truth it may be provided with.

247. It might, indeed, very easily be supposed that even pure mathematics itself would have need of one department of philosophy, that is to say, of logic. Yet a little reflection would show, what the history of science confirms, that that is not true. Logic will, indeed, like every other science, have its mathematical parts. There will be a mathematical logic just as there is a mathematical physics and a mathematical economics. If there is any part of logic of which mathematics stands in need — logic being a science of fact and mathematics only a science of the consequences of hypotheses — it can only be that very part of logic which consists merely in an application of mathematics, so that the appeal will be, not

of mathematics to a prior science of logic, but of mathematics to mathematics. Let us look at the rationale of this a little more closely. Mathematics is engaged solely in tracing out the consequences of hypotheses. As such, she never at all considers whether or not anything be existentially true, or not. But now suppose that mathematics strikes upon a snag, and that one mathematician says that it is evident that a consequence follows from a hypothesis, while another mathematician says it evidently does not. Here, then, the mathematicians find themselves suddenly abutting against brute fact; for certainly a dispute is not a rational consequence of anything. True, this fact, this dispute, is no part of mathematics. Yet it would seem to give occasion for an appeal to logic, which is generally a science of fact, being a science of truth, and whether or not there be any such thing as truth is a question of fact. However, because this dispute relates merely to the consequence of a hypothesis, the mere careful study of the hypothesis, which is pure mathematics, resolves it, and after all, it turns out that there was no occasion for the intervention of a science of reasoning.

248 It is often said that the truths of mathematics are infallible. So they are, if you mean practical infallibility, infallibility such as that of conscience. They appear even as theoretically infallible, if they are viewed through spectacles that cut off the rays of blunder. I never yet met with boy or man whose addition of a long column, of fifty to a hundred lines, was absolutely infallible, so that adding it a second time could in no degree increase one's confidence in the result, nor ought to do so. The addition of that column is, however, merely a repetition of $1 + 1 = 2$, so that, however improbable it may be, there is a certain finite probability that everybody who has ever performed this addition of 1 and 1 has blundered, except on those very occasions on which we are accustomed to suppose (on grounds of probability merely) that they *did* blunder. Looked at in this light, every mathematical inference is merely a matter of probability. At any rate, in the sense in which anything in mathematics is certain, it is most certain that the whole mathematical world has often fallen into error, and that, in some cases, such errors have stood undetected for a couple of millennia. But no case is adducible in which

the science of logic has availed to set mathematicians right or to save them from tripping. On the contrary, attention once having been called to a supposed inferential blunder in mathematics, short time has ever elapsed before the whole mathematical world has been in accord, either that the step was correct, or else that it was fallacious; and this without appeal to logic, but merely by the careful review of the mathematics as such. Thus, historically mathematics does not, as *a priori* it cannot, stand in need of any separate science of reasoning.

249 But mathematics is the only science which can be said to stand in no need of philosophy, excepting, of course, some branches of philosophy itself. It so happens that at this very moment the dependence of physics upon philosophy is illustrated by several questions now on the *tapis*. The question of non-Euclidean geometry may be said to be closed. It is apparent now that geometry, while in its main outlines, it must ever remain within the borders of philosophy, since it depends and must depend upon the scrutinizing of everyday experience, yet at certain special points it stretches over into the domain of physics. Thus, space, as far as we can see, has three dimensions, but are we quite sure that the corpuscles into which atoms are now minced have not room enough to wiggle a little in a fourth? Is physical space hyperbolic, that is, infinite and limited, or is it elliptic, that is, finite and unlimited? Only the exactest measurements upon the stars can decide. Yet even with them the question cannot be answered without recourse to philosophy. But a question at this moment under consideration by physicists is whether matter consists ultimately of minute solids, or whether it consists merely of vortices of an ultimate fluid. The third possibility, which there seems to be reason to suspect is the true one, that it may consist of vortices in a fluid which itself consists of far minuter solids, these, however, being themselves vortices of a fluid, itself consisting of ultimate solids, and so on in endless alternation, has hardly been broached. The question as it stands must evidently depend upon what we ought to conclude from everyday, unspecialized observations, and particularly upon a question of logic. Another still warmer controversy is whether or not it is proper to endeavor to find a mechanical explanation of electricity, or whether it is proper, on the contrary, to leave the

differential equations of electrodynamics as the last word of science. This is manifestly only to be decided by a scientific philosophy very different from the amateurish, superficial stuff in which the contestants are now entangling themselves. A third pretty well defended opinion, by the way, is that instead of explaining electricity by molar dynamics, molar dynamics ought to be explained as a special consequence of the laws of electricity. Another appeal to philosophy was not long ago virtually made by the eminent electrician, the lamented Hertz, who wished to explain force, in general, as a consequence of unseen constraints. Philosophy alone can pronounce for or against such a theory. I will not undertake to anticipate questions which have not yet emerged, otherwise, I might suggest that chemists must ere long be making appeal to philosophy to decide whether compounds are held together by force or by some other agency. In biology, besides the old logico-metaphysical dispute about the reality of classifications, the momentous question of evolution has unmistakable dependence on philosophy. Then again, caryocinesis has emboldened some naturalists, having certain philosophical leanings, to rebel against the empire of experimental physiology. The origin of life is another topic where philosophy asserts itself, and with this I close my list, not at all because I have mentioned all the points at which just now the physical sciences are influenced by a philosophy, such as it is, but simply because I have mentioned enough of them for my present purpose.

250 The dependence of the psychical sciences upon philosophy is no less manifest. A few years ago, indeed, regenerate psychology, in the flush of her first success, not very wisely proposed to do without metaphysics, but I think that today psychologists generally perceive the impossibility of such a thing. It is true that the psychical sciences are not quite so dependent upon metaphysics as are the physical sciences, but, by way of compensation, they must lean more upon logic. The mind works by final causation, and final causation is logical-causation. Note, for example, the intimate bearing of logic upon grammatical syntax. Moreover, everything in the psychical sciences is inferential. Not the smallest fact about the mind can be directly perceived as psychical. An emotion is directly felt as a bodily state, or else it is only known inferen-

tially 'That a thing is agreeable appears to direct observation as a character of an object, and it is only by inference that it is referred to the mind. If this statement be disputed (and some will dispute it), all the more need is there for the intervention of logic. Very difficult problems of inference are continually emerging in the physical science. In psychology, there are such questions as free will and innate ideas; in linguistics, there is the question of the origin of language, which must be settled before linguistics takes its final form. The whole business of deriving ancient history from documents that are always insufficient and, even when not conflicting, frequently pretty obviously false, must be carried on under the supervision of logic, or else be badly done.

251. The influence of philosophy upon the practical sciences is less direct. It is only here and there that it can be detected; and ethics is the division of philosophy which most concerns these sciences. Ethics is courteously invited to make a suggestion now and then in law, jurisprudence, and sociology. Its sedulous exclusion from diplomacy and economics is immense folly. We are unhappily debarred from calling this folly stupendous or egregious, because it is merely the ordinary blindness of those who profoundly believe that lies are the most wholesome of diet, who, as Edgar Poe sagaciously said, when they get home, have once locked themselves in their several chambers, have undressed, knelt down by the bedside and said their prayers, got into bed, and blown out the candle, then, at length, and not till then, indulge in one veracious wink — the only veracious act of the day — and lull themselves to sleep with an inward ditty that Right is a silly thing without wealth or vigor in this work-a-day world. One day man shall start up out of his slumber to see by broad daylight that that despised idea has all along been the one irresistible power. Then may begin an era when it is counted within the practical sciences, one and all — when, in a word, a man will not design a stove nor order a coat without stopping first and sifting out his real desire — and it is prophecy as simple as *Barbara*, that, when that comes to pass, those sciences will answer even their lower and nearest purposes far more perfectly than at present they do. So, at any rate, the student of minute logic will be forced to think.

252. The direct action of the special psychical and physical sciences — the two subclasses of Class III — upon one another seems to be slight. One cannot see how, except in some accidental or exterior way, the psychical sciences are to influence the physical sciences, unless it should be found advantageous to call upon psychology to aid the physical observer in avoiding illusions and in diminishing his errors of observation. This, no doubt, deserves careful consideration; but I believe that, if the proper distinctions are drawn, it will be seen that as for illusions, the far better way, when it is practicable, as it almost always will be, will be to make the observations so simple and positive that no illusions can occur often enough to make any special dealing desirable; and as for errors of observation, it is best to treat them as residual phenomena like any other residual phenomena. That they are entirely physical every physicist must insist, physics being sufficiently advanced to see that all phenomena, without exception, are physical, for the purposes of physics. Soon we may hope that all psychologists, on their side, may be equally at one that all phenomena without exception are purely psychical for the purposes of psychics.

253. How far then are the psychical sciences influenced by physiognosy, or how far ought they to be so influenced? The theory of psychophysical parallelism would seem to imply that there is and can be no influence at all. But I must confess myself to be of the party which thinks that no psychical fact, as such, can be observed. The direct percept, as it first appears, appears as forced upon us brutally. It has no generality; and without generality there can be no psychicality. Physicality consists in being under the governance of physical, *i e.*, efficient, causes, psychicality in being under the governance of psychical, *i e.*, of final, causes. The percept brutally forces itself upon us, thus it appears under a physical guise. It is quite ungeneral, even antigeneral — in its character as percept; and thus it does not appear as psychical. The psychical, then, is not contained in the percept.

254. “But what?” some one will say, “Does one not perceive redness? And is not redness purely a psychical matter to which nothing in the physical world corresponds?” If one must answer *yes* or *no*, in the rough, of course one must say *yes*. Yet as to there being nothing in the physical universe that corre-

sponds to a given psychical phenomenon, the doctrine of parallelism itself disavows that opinion. Better let us say that in the present state of physical theory the peculiarity of redness finds no definite explanation. It would be an illogical presumption to say that it never can be explained. Redness, though a sensation, does not in the percept proclaim itself as such. At any rate, whether the psychical can be directly observed or not, no linguist, ethnologist, nor historian — no psychologist, even, in an unguarded moment — but will agree that his science rests very largely, if not quite entirely, upon physical *facts*.

255. This does not amount to an acknowledgment of need of help from the physical *sciences*. Some amount of such need and such help there is. It is easier detected than the dubious help received by physiognosy from psychognosy. The historian certainly depends in a measure upon physical geography. Linguistics must in the future receive substantial assistance from acoustics, in more than one direction, and from the anatomy of the vocal organs and of the ear. Besides such supplies of information, (which are relatively unimportant) psychognosy has received instruction and encouragement from the example of physiognosy in the nineteenth century. It has been helped to minute accuracy, to objectivity, to genuine love of truth as against the professor's profession of infallibility. Yet summing up all the items, the total influence is trifling compared with that of mathematics on philosophy or of both on idioscopy. Physics has, after all, supplied no principle to psychics, nor any great conception. On the contrary, every attempt to import into psychics the conceptions proper to physics has only led those who made it astray. All this confirms the justice of our rating of these two departments as subclasses.

256. We can now no longer postpone the recognition of a second subbranch of theoretical science. It is a department perfectly well recognized. It belongs by virtue of its purpose to the branch of Theory, yet varies enough in its purpose from the active science to be erected into a subbranch. It is the subject of Humboldt's *Cosmos*, Comte's *Philosophie positive*, and Spencer's *Synthetic Philosophy*. It is science *en retraité*, *Wissenschaft a D.* Its design is to sum up the results of all the theoretical sciences and to study them as forming one system. It

may be called *retrospective* [or science of review], in contradistinction to *active* science

257. We now come to consider groups one grade lower. Here is a point where I must confess to have hesitated. Our branches of science are distinguished by their different purposes; our classes by the fundamentally different nature of their observations. Logic suggests that *orders*, to which we next come, should be distinguished by the difference in the intellectual part of the business of the sciences under them; so that among the Physical Sciences, for example, we should have first those which investigate the laws common to all matter, second, those which study the relations between different classes of physical objects; third, those whose objects are the understanding of different individual objects, and it is plain that a similar classification could be made in psychics. Still, although this seems *a priori* plausible, a positive guarantee that this will be a natural division is perhaps lacking. At any rate, no ground of assurance is evident. It has occurred to me that we might distribute the physical sciences into those which study objects predominantly under the dominion of force and those predominantly under the influence of final causality, giving physics and natural history. This separation would well accord with the way in which the men naturally cluster. But for that very reason, a suspicion is created that the point has not yet been reached where that cleavage should be made. Before we come to groups of men thoroughly understanding one another's work, we ought to consider groups of which the one stands in the relation of teacher of principles to another; just as, in a school, the relation of master and pupil makes a broader natural division than that between different forms or classes. . . .

258. Comte . . . produced a useful scale, as every candid man now confesses. It ran thus: Mathematics, Astronomy, Physics, Chemistry, Biology, Sociology. But sociology stands distinctly aloof from the others, as a psychical science. Astronomy, for Comte, meant the astronomy of his day, which was confined almost entirely to explaining the motions of the stars, and was thus directly dependent on mathematics. But our astronomy depends largely on chemistry. Striking out mathematics and sociology, which are not physical sciences, and put-

ting astronomy where it now seems to belong, we get Physics, Chemistry, Biology, Astronomy, or perhaps

Physics

Chemistry

Biology

Astronomy

Geognosy was intended by Comte to be a subdivision of physics. But this is every way unnatural. Geognosy applies physics as well [as] biology (especially paleontology); so that a still better scheme would be

Physics

Chemistry

Biology

Astronomy

Geognosy

259. In this scheme, we see a return to my first idea. For physics, here, must mean general physics, so called, that is, the study of the laws and forces of nature. Chemistry must here be understood as the science of the different kinds of matter (which is substantially the definition of Ostwald and of Mendeléef). Thus the second lines are sciences of classes, or, say for brief, Classificatory Sciences, which of course have much more to do than merely to make schemes of classification. In the third line we find sciences descriptive and explanatory of individual objects, or individual systems, the heavens, and the earth. We may name them, by way of abridgment, Descriptive Sciences.

260. We may take it as settled, then, that nomological physics forms naturally the first order of the subclass of the physical sciences. But whether the others ought primarily to be divided according to the rows of the last scheme, or according to its columns is a question upon which a little further consideration needs to be bestowed. In this connection we remark that the affinity of geognosy to biology is hardly as decided as the vertical division would represent it to be. One cannot even say that chemistry is more allied to astronomy than it is to biology. Light may be thrown upon the matter by asking where crystallography and mineralogy should be placed. Nobody, surely, would hold it to be a natural classification to rank crystallography as coördinate with chemistry and biology. Nor does it belong to general nomological physics, for it is eminently a study of kinds, not of general laws. A suggestion of uniting it to biology would provoke a smile. It would seem,

then, that nothing remains but to treat it as a division of chemistry, in the sense of the study of the different kinds of matter. Two great authorities, Ostwald and Mendeléef, do, in fact, so define chemistry, but I venture to assert that chemists generally do not so understand their science, and that chemical laboratories are not equipped for that study. Chemistry is, as a matter of fact, pretty closely limited to the study of reactions, to the structure of compounds, and to the behaviour of elements in combinations. A chemist, as such, does not feel himself called upon to inquire further into the properties of the different substances than is required to identify them and to make out their constitutional relations. He would, for example, think it quite beyond his province to arrest his work to determine the constants of elasticity of a substance. To ask that of him, he would say, would be a mischievous mixing of vocations. The descriptions that chemists give of crystals — in most cases confined to their habits — would be regarded by a crystallographer as superficial, and if they occasionally go further, it is with a view to the identification of the substances. The definition of Ostwald and Mendeléeff, then (which I myself independently gave), defines a department of science of which chemistry is but a part. Let us call the science of the kinds of matter by the name of *chemology*. This science will have to describe all the special properties of all kinds of matter, and among these properties, will have to describe the shapes into which matter of different kinds grows. So, then, we may reckon crystallography as a branch of chemology.

261. We cannot but remark, in passing, that a certain doubt arises here, because the study of the different kinds of crystalline form — with their geometrical, elaterical, and optical relations to one another — will look upon the facts of crystallization from quite another standpoint from that of the chemologist who is considering the relations of the different kinds of matter to one another. But I pass that by for the moment in order to make another remark. Suppose it were settled that that difference of the points of view of the crystallographer and the chemologer were of subsidiary importance, and that the latter's business includes the study [of] all the forms that different kinds of matter naturally assume. Then I remark that there is a certain group of chemical bodies, the

-albuminoids or protoplasms, of which, down to this time, the chemist can only say that they contain carbon (51 or 52 per cent), oxygen (20 to 23 per cent), nitrogen (16 to 19 per cent), hydrogen (about 7 per cent), sulphur (about 1 per cent), and probably often phosphorus and many other elements, and that there are something like fifteen thousand atoms to the molecule. These substances assume forms far more fantastical than crystals — namely all the forms that the biologist describes; and the mathematician assures us that even if the number of atoms to the molecule is greatly less than the number which Sabanajeff* has determined by an approved method, there nevertheless can be no doubt that it is sufficient to afford, on general principles of chemistry, enough different kinds of protoplasm for each organ, or even cell of every individual animal or plant that ever existed on earth to have a unique kind of its own, without seriously encroaching upon the wealth of varieties of these substances. So, then, we may rationally conclude that all the variety of the biological world is due to the variety of the different kinds of chemical substances of this group, with their corresponding variety of properties and of natural figures. Thereupon in comes the logician, and for his contribution to the discussion, declares it to be absolutely impossible to frame any definite hypothesis — however gratuitous — which should assign any other origin to the forms of animals and plants than the chemical constitution of the protoplasm. Imagine, if you like, that separate corpuscles related to atoms as atoms are to billiard balls, are endowed with free will, so that their motions are determined by persuasion and not by the general laws of physics. That, if proved, would be a momentous discovery enough. I know not what could tend more toward the obliteration of all distinction between psychognosy and physiognosy. Nevertheless, under that state of things it would remain true that the chemical constitution of the protoplasm, about which we now make no pretension to knowing anything, although it would then turn out to be so mighty strange, containing chemical elements that would put radium to the blush — that chemical constitution, I say, would even then be the sole determining cause of the forms of all

* See Poggendorff's *Biographisch-literarisches Handwörterbuch* (1883-1904), bk. IV, p. 1293, for an account of Sabanajeff's work and life.

animals and plants So it would remain, though we were to suppose a special creative act at the birth or budding of each biological individual — as long as there remained an approximate regularity in the action — although this would be still more revolutionary of all our chemological conceptions We all know the type of naturalist — often a justly honored man of science — who, at any suggestion that experiment can ever be of real avail in biology, pours forth a torrent in which feeling is more easily detected than logic Some minds there are who seem to think that if A and B are radically dissimilar, it is weak to admit that they can be fundamentally unlike, although could this not be, there would be an end of natural classification Nobody can dispute the fact that the albuminoids are radically unlike all chemical substances whose constitution we understand

262 If then we are to have an order or suborder of physiognosy consisting of the study of kinds of matter and their natural forms, it is a requirement of logic that biology should be reckoned as a family of that order or suborder It must no doubt be admitted that the study of the kinds of matter, chemistry, is one thing and the study of the kinds of forms that matter may take is another. These will be two suborders of the order of classificatory physiognosy, or the study of physical kinds But into which of these suborders biology should be placed is not so clear. Perhaps it should constitute a third suborder

263. In addition, we must recognize a third order, descriptive and explanatory of the accidents of individual systems, apart from the study of the classes to which they belong

264 Is there a somewhat parallel division of psychognosy? "Anthropology" is a word sometimes used in so broad a sense that it covers all psychognosy, or would do so, were the study of animals and of non-biological manifestations of mind not arbitrarily excluded Of anthropology, so understood, the late Dr Brinton * proposed a classification, an outline of which may usefully be put before the reader It includes, in the first place, four grand divisions of somatology, ethnology, ethnography, and archeology The first of these is purely physical,

* *Anthropology As a Science*, by D. G Brinton, published in pamphlet form, Philadelphia, 1892

except that it strangely includes psychology, so that it does not now concern us. The fourth is purely descriptive, and largely physical. It will afford no help. Ethnology is made to include five departments, as follows: 1. Sociology. 2. Technology, embracing the fine and useful arts. 3. Religion. 4. Linguistics. 5. Folklore. Ethnography treats of the different races of men, and is largely physical. I have no objection to admitting that zoology must perforce take some cognizance of the instincts of animals, just as on the other hand, it is quite evident that their minds can never be understood without taking some account of their anatomy and physiology. But for all that, if we are to admit that the study of animals' bodies is a study of efficiency, while the study of their minds is a study of finality, a distinction the truth and unescapableness [of which] will only be emphasized the more we study the different phases and facets of the subject, then we must acknowledge that those two studies of animals' minds and of animals' bodies are widely different, however much they may overlap. But in truth the overlapping is quite trifling. Very little psychology is needed by the biologist, and no very deep biology by the psychologist.

265 Dr. Brinton's classification is artificial. He would hardly himself have contested that judgment. Of almost any subdivision of it, it may be said that no man could judiciously devote himself to all those studies exclusively. Probably no man ever did, if we read Brinton's explanation of what each includes. But the classification has a fault even worse than that of being artificial. There can be no objection to a man's engaging at one time in tracing out final, or mental, causation, and at another time in tracing out material, or efficient, causation. But to confound these two things together is fatal. That circumstance constitutes a certain measure of justification for the warfare that has been waged, in many quarters, upon "final causes", and it equally justifies the dislike often felt to physical explanations. Longfellow used to say that he hated sciences. I can sympathize with him. For he lived so entirely in the psychical world, that science to him meant an endeavor to turn finality into efficiency, or as he would say, to refute poetry. It is most narrow not to consider final causes in the study of nature, but it is nonsense and utter confusion to treat

them as forces in the material sense Dr Brinton, along with ethnologists generally, appears to be oblivious to this, throughout, and to look upon the study of the psychical from a psychical point of view as essentially inexact. To ask whether a given fact is due to psychical or physical causes is absurd. Every fact has a physical side, perhaps every fact has a psychical side Its physical aspect — as a mere motion — is due exclusively to physical causes, its psychical aspect — as a deed — is due exclusively to psychical causes This remains true, though you accept every doctrine of telepathy, table-turning, or what you will If I can turn a table by the force of my will, this will simply establish the fact that something between me and the table acts just as a stick with which I should poke the table would act It would be a physical connection purely and simply, however interesting it might be to a psychologist. But on the other hand, as my hand obeys, in a general way, my commands, clutching what I tell it to clutch, though I leave to its better judgment all the *menu* of just how my general order is to be carried out (and so I do with my rapier, directing its point to move so and so, but how it is done I never know), so the table-turning experiment would, I suppose, show that I could give similar general orders to the untouched table That would be purely psychical, or final, causation, in which particulars are disregarded. Meantime, one may note that the table certainly *will* turn, if I really and truly *will* that it shall without being too meticulous about ways and means.

266 Three items only of Brinton's somatology belong to psychognosy They are, first, prosopology, so far as that refers to the dubious science of physiognomy, second, psychology, and third, criminal-anthropology A great part of his ethnography simply considers men as biological forms. So, too, the physical geography, geology, and paleontology that he includes. This latter I had not supposed belonged to the science of man On the other hand much of psychognosy is omitted, such as the study of animal and vegetable instinct (both of which, especially the latter, throw much light on man's nature), theology as such (supposing there is such a science), economics, esthetics (so far as it is neither philosophy on the one hand, nor practical science on the other), and history in all its many branches (and it seems to me strange that Dr. Brinton, who

makes almost everything else pertain to the science of man, should think that history does not do so), and biography.

267. Let us now, with Dr. Brinton's list before us, endeavor to survey psychognosy and make out its orders. In the first place, final causality, which is the object of psychical science, appears in three guises, first, quite detached from any biological organism; second, in biological individuals as vehicles; third, in societies, ranging from the family to that public which includes our indefinite "posterity." These distinctions, when we thus consider them together, impress us with a certain grandeur. It may be that this explains what, at any rate, is a fact, that the question has often pressed itself upon me whether they ought not to form the basis of the first division of the class of psychical sciences. But this would be merely, or mainly, a division according to the nature of the objects of study. We ought to classify the sciences according to their own natures, and not according to the nature of their objects in the least, except so far as this affects the nature of the studies of these objects.¹ But before taking anything of that sort into account, we ought to look for a division based on the differences of the intellectual factor in the work of science, such as has been found to constitute the three orders of physiognosy, to wit, the nomological, the classificatory, and the descriptive. These orders appear more and more clear, the further the subject is examined. Mind has its universal laws, operative wherever it is manifested, although these may be modified according to the mode of its incarnation or other manifestation. In studying the universal properties of mind, the student will, no doubt, have occasion to remark some of the peculiarities of different modes of manifestation of mind. It may easily happen to a young student that this study of special kinds of productions of mind comes to fascinate and absorb him far more than the thinner and abstracter science of mind's universal truths. It may happen to another student that while he makes elaborate studies of a special form of psychical fruit, he will never cease to pursue those studies with a view to their affording some clue to the general secrets of mind. Just so, a man may study the systems [of] crystals for the sake of their teachings concerning

¹ The opposite opinion is argued explicitly by Shields in his *Philosophia Ultima*, with as much force as the position allows.

the nature of elasticity, as Rankine did, or in hopes of learning from them something about light, as Brewster did; or on the other hand, being interested in crystals and their classes, with a view to gaining a better comprehension of them, he may make studies of their cohesion, as Hauy did, and with either of these motives, he may produce a memoir which, in itself considered, might very well be classed either as a contribution to nomological physics or to crystallography. Take a larger view of his work, and there will be no possible doubt that Brewster and Rankine were physicists, while Hauy was a botanist turned crystallographer.

268. What shall we classifiers do with studies which might equally belong to either of two groups? Shall we, for the sake of convenience, allow a little artificiality to enter into our classification, so as to give such a study an undoubted place? That would be compromise. Now we ought always to be willing to compromise judiciously in practical matters, never in theoretical science. But if there be any such thing as natural classification, it is the truth, the theoretical truth, which is not to be sacrificed to convenience. It may be different with a classification of sciences designed to govern the alcove-arrangement of a library. That is a question for separate discussion. I will only remark here that the purposes of alcove-arrangement are so multifarious, that it will not in many cases happen that the integral convenience of any one artificial arrangement is markedly superior to that of the natural arrangement. The natural classification of science must be based on the study of the history of science, and it is upon this same foundation that the alcove-classification of a library must be based. The natural classification of science is to be a classification of men of science, and because each great man's works are published in collected form, the alcove-classification of a library must also be a classification of men. At any rate, for our convenience in this chapter the plain truth untampered with alone will answer. Where it happens that the truth is that the defining lines between natural classes are not absolutely definite, it is that truth which we want stated.

269. Mind has its universal mode of action, namely, by final causation. The microscopist looks to see whether the motions of a little creature show any purpose. If so, there is

mind there. Passing from the little to the large, natural selection is the theory of how forms come to be adaptive, that is, to be governed by a *quasi* purpose. It suggests a machinery of efficiency to bring about the end — a machinery inadequate perhaps — yet which must contribute some help toward the result. But the being governed by a purpose or other final cause is the very essence of the psychical phenomenon, in general. There ought, therefore, one would think, to be under the order of psychonomy, or nomological psychognosy, a suborder which should seek to formulate with exactitude the law of final causation and show how its workings are to be traced out.

270 But under this universal law of mind, there are other laws, it may be equally ubiquitous yet not so abstract. There is, first of all, the great law of association (including fusion), a principle strikingly analogous to gravitation, since it is an attraction between ideas. There are, besides, other general phenomena of mind not explicable by association. The laws of all these phenomena will be studied under a second suborder of special nomological psychology.

271 As a second order, we have psychotaxy, not a very good name for classificatory psychognosy or the study of kinds of mental manifestation. This order falls into two suborders, the one embracing studies of mental performances and products, the other of incarnations, or ensoulments of mind. To the latter suborder I would refer all studies of the minds of insects and (when there are any) of octopuses, of sexual characteristics, of the seven ages of human life, of professional and racial types, of temperaments and characters. To the former suborder, I would refer the vast and splendidly developed science of linguistics, of customs of all kinds, of Brinton's ethnology generally.

272 A third order of psychognosy is descriptive and explanatory, but not in any predominant degree inductive. Those sciences which are mainly descriptive, which tell, for example, what an explorer has found, which give accounts of systems, as metrology, chronology, numismatics, heraldry, or examine individual productions of man, will form a descriptive suborder, while those which narrate sequences of events and show how one leads to another — History in short, whether of individuals, or of communities, or of fields of activity, or of the

development of minds, or of forms of social institutions, will form a second suborder.

§5. THE DIVISIONS OF PHILOSOPHY*

273 It is plain that philosophy cannot, like idioscopy, be split from top to bottom into an efficient and a final wing. For, not to mention other reasons, to philosophy must fall the task of comparing the two stems of causation and of exhuming their common root. In another way, however, philosophy falls asunder into two groups of studies to which the appellation of subclasses is alone appropriate, if we are to understand by a subclass a modification of that class-making sense in which philosophy may be said to be observational. For besides what constitutes — in the present stage of the study, at least — the main body of philosophy, resting exclusively upon universal experience, and imparting to it a tinge of necessity, there is a department of science which, while it rests, and can only rest, as to the bulk of it, upon universal experience, yet for certain special yet obtrusive points is obliged to appeal to the most specialized and refined observations, in order to ascertain what minute modifications of everyday experience they may introduce. If in these departments the teachings of ordinary experience took on the true complexion of necessity, as they usually do, it would hardly be in our power to appeal to special experience to contradict them. But it is a remarkable fact that though inattentive minds do pronounce the dicta of ordinary experience in these cases to be necessary, they do not appear so to those who examine them more critically. For example, everyday experience is that events occur in time, and that time has but one dimension. So much appears necessary. For we should be utterly bewildered by the suggestion that two events were each anterior to the other or that, happening at different times, one was not anterior to the other. But a two-dimensional anteriority is easily shown to involve a self-contradiction. So, then, that time is one-dimensional is, for the present, necessary, and we know not how to appeal to special experience to disprove it. But that space is three-dimensional involves no such necessity. We can perfectly well suppose that atoms or their corpuscles move freely in four or more dimensions. So

* Cf. vol. 5, bk. I, lecture V, §1

everyday experience seems to teach us that time flows continuously. But that we are not sure that it really does so, appears from the fact that many men of powerful minds who have examined the question are of the opinion that it is not so. Why may there not be a succession of stationary states, say a milliasse or so of them or perhaps an infinite multitude per second, and why may states of things not break abruptly from one to the next? Here the teachings of ordinary experience are, at least, difficult of ascertainment. There are cases where they are decidedly indefinite. Thus, such experience shows that the events of one day or year are not exactly like those of another, although in part there is a cyclical repetition. Speculative minds have asked whether there may not be a complete cycle at the expiration of which all things will happen again as they did before. Such is said to have been the opinion of Pythagoras, and the stoics took it up as a necessary consequence of their philistine views. Yet in our day, certain experiences, especially the inspiring history of science and art during the nineteenth century, have inclined many to the theory that there is endless progress, a definite current of change on the whole of the whole universe. What treasures would we not sacrifice for the sake of knowing for certain whether it really be so, or not! It is nothing to you or me, to our children, or to our remoter posterity. What concern have we with the universe, or with the course of ages? No more than my dog has in the book I am writing. Yet I dare say he would defend the manuscript from harm with his life. However, to return to the matter of progress, universal experience is rather for the notion than against it, since there is a current in time, so far as we can see. the past influences our intellect, the future our spirit, with entire uniformity. Still universal experience merely favors a guess as to larger periods.

274 There are two distinct questions to be answered concerning time, even when we have accepted the doctrine that it is strictly continuous. The first is, whether or not it has any exceptional instants in which it is discontinuous,— any abrupt beginning and end. Philosophers there have been who have said that such a thing is inconceivable; but it is perfectly conceivable to a mind which takes up intelligently and seriously the task of forming the conception. Men who are ready to

pronounce a thing impossible before they have seriously studied out the proper way of doing it, and especially without having submitted to a course of training in making the requisite exertion of will, merit contempt. When a man tells us something is inconceivable, he ought to accompany the assertion with a full narrative of all he has done in these two ways to see if it could not be conceived. If he fails to do that, he may be set down as a trifler. There is no difficulty in imagining that at a certain moment, velocity was suddenly imparted to every atom and corpuscle of the universe, before which all was absolutely motionless and dead. To say that there was no motion nor acceleration is to say there was no time. To say there was no action is to say there was no actuality. However contrary to the evidence, then, such a hypothesis may be, it is perfectly conceivable. The other question is whether time is infinite in duration or not. If it has no flaw in its continuity, it must, as we shall see in chapter 4,* return into itself. This may happen after a finite time, as Pythagoras is said to have supposed, or in infinite time, which would be the doctrine of a consistent pessimism.

275. Measurement, as shall, in due course, be distinctly proved†, is a business fundamentally of the same nature as classification, and just as there are artificial classifications in profusion, but only one natural classification, so there are artificial measurements to answer every demand, but only one of them is the natural measurement. If time returns into itself, an oval line is an icon [or analytic picture] of it. Now an oval line may be so measured as to be finite, as when we measure positions on a circle by an angular quantity, θ , running up to 360 degrees, where it drops to 0 degree (which is the natural measure in the case of the circle), or it may be measured so that the measure shall once pass through infinity, in going round the circle, as when we project the positions on the circumference from one of them as a centre upon a straight line on which we measure the shadows by a rigid bar, as in the accompanying figure, here. This is measuring by $\tan \frac{1}{2}(\theta - \Theta)$, instead of by θ , where Θ depends upon the position of

* That part of ch 4 does not appear to have been written, see 584n. The nature of time is discussed at some length in vol 6

† See 4 142ff

Book III

PHENOMENOLOGY



CHAPTER 1

INTRODUCTION*

§1. THE PHANERON†

284 Phaneroscopy is the description of the *phaneron*, and by the *phaneron* I mean the collective total of all that is in any way or in any sense present to the mind, quite regardless of whether it corresponds to any real thing or not. If you ask present *when*, and to *whose* mind, I reply that I leave these questions unanswered, never having entertained a doubt that those features of the phaneron that I have found in my mind are present at all times and to all minds. So far as I have developed this science of phaneroscopy, it is occupied with the formal elements of the phaneron. I know that there is another series of elements imperfectly represented by Hegel's Categories. But I have been unable to give any satisfactory account of them.

285. English philosophers have quite commonly used the word *idea* in a sense approaching to that which I give to *phaneron*. But in various ways they have restricted the meaning of it too much to cover my conception (if conception it can be called), besides giving a psychological connotation to their word which I am careful to exclude. The fact that they have the habit of saying that "there is no such idea" as this or that, in the very same breath in which they definitely describe the phaneron

* According to the scheme of classification given in the preceding book, phenomenology (or phaneroscopy) is the first division of philosophy, which is, in turn, the second of the sciences of discovery. The present book, to follow that scheme, should have been preceded by one on mathematics, the first of the sciences of discovery. Peirce's positive contributions to that science, however, are too technical for the general reader and his discussions of it are too closely interwoven with the discussions of other topics to make their inclusion in the present volume feasible. Most of the contributions to mathematics are to be found in vols. 3 and 4, the discussions regarding its nature are scattered throughout all the volumes, see c g 247ff.

† 284 is from the "Adirondack Lectures, 1905", 285-287 are from "Logic viewed as Semiotics, Introduction Number 2, Phaneroscopy," c 1901.

hexads (though by junction of bonds they usually appear as dyads),

F, Cl, Mn, Br, -, I, are properly heptads (usually appearing as monads);

Fe, Co, Ni, Ru, Rh, Pd, -, -, -, Os, Tr [Ir], Pt, are octads; (Sm, Eu, Gd, Er, Tb, Bz [?], Cl [Ct], are not yet placed in the table.)

290. So, then, since elements may have structure through valency, I invite the reader to join me in a direct inspection of the valency of elements of the phaneron. Why do I seem to see my reader draw back? Does he fear to be compromised by my bias, due to preconceived views? Oh, very well, yes, I do bring some convictions to the inquiry. But let us begin by subjecting these to criticism, postponing actual observation until all preconceptions are disposed of, one way or the other.

291. First, then, let us ask whether or not valency is the sole formal respect in which elements of the phaneron can possibly vary. But seeing that the possibility of such a ground of division is dependent upon the possibility of multivalence, while the possibility of a division according to valency can in nowise be regarded as a result of relations between bonds, it follows that any division by variations of such relations must be taken as secondary to the division according to valency, if such division there be. Now (my logic here may be puzzling, but it is correct), since my ten trichotomies of signs,* should they prove to be independent of one another (which is to be sure, highly improbable), would suffice to furnish us classes of signs to the number of

$$\begin{aligned}
 3^{10} &= (3^2)^5 = (10-1)^5 = 10^5 - 5 \cdot 10^4 \\
 &\quad + 10 \cdot 10^3 - 10 \cdot 10^2 \\
 &\quad + 5 \cdot 10 - 1 \\
 &= 50000 \\
 &\quad + 9000 \\
 &\quad + 49 \\
 &= 59049
 \end{aligned}$$

(*Voulà* a lesson in vulgar arithmetic thrown in to boot!), which

* See the letters to Lady Welby. These ten trichotomies are not to be confused with the ten not completely independent classes of signs given in vol. 2, bk II. The latter originate from only three trichotomies, while the ten trichotomies yield sixty-six not completely independent classes of signs.

calculation threatens a multitude of classes too great to be conveniently carried in one's head, rather than a group inconveniently small, we shall, I think, do well to postpone preparations for further divisions until there be prospect of such a thing being wanted.

292. If, then, there be any formal division of elements of the phaneron, there must be a division according to valency, and we may expect medads, monads, dyads, triads, tetrads, etc. Some of these, however, can be antecedently excluded, as impossible, although it is important to remember that these divisions are not exactly like the corresponding divisions of Existential Graphs,* which have relation only to explicit indefinites. In the present application, a medad must mean an indecomposable idea altogether severed logically from every other, a monad will mean an element which, except that it is thought as applying to some subject, has no other characters than those which are complete in it without any reference to anything else, a dyad will be an elementary idea of something that would possess such characters as it does possess relatively to something else but regardless of any third object of any category, a triad would be an elementary idea of something which should be such as it were relatively to two others in different ways, but regardless of any fourth, and so on. Some of these, I repeat, are plainly impossible. A medad would be a flash of mental "heat-lightning" absolutely instantaneous, thunderless, unremembered, and altogether without effect. It can further be said in advance, not, indeed, purely *a priori* but with the degree of apriority that is proper to logic, namely, as a necessary deduction from the fact that there are signs, that there must be an elementary triad. For were every element of the phaneron a monad or a dyad, without the relative of teridentity† (which is, of course, a triad), it is evident that no triad could ever be built up. Now the relation of every sign to its object and interpretant is plainly a triad. A triad might be built up of pentads or of any higher perissad elements in many ways. But it can be proved — and really with extreme simplicity, though the statement of the general proof is confusing — that no element can have a higher valency than three.

* See vol 4, bk II

† Cf 346

§3. MONADS, DYADS, AND TRIADS*

293. A thorough study of the logic of relatives confirms the conclusions which I had reached before going far in that study. It shows that logical terms are either monads, dyads, or polyads, and that these last do not introduce any radically different elements from those that are found in triads. I therefore divide all objects into monads, dyads, and triads; and the first step in the present inquiry is to ascertain what are the conceptions of the pure monad, free from all dyadic and triadic admixtures; of the dyad (which involves that of the monad) free from all triadic contamination, and what it is that is peculiar which the dyad adds to the monad; and of the triad (which involves those of the monad and dyad) and what it is that is characteristic of the triad.

§4. INDECOMPOSABLE ELEMENTS†

294. I doubt not that readers have been fretting over the ridiculous-seeming phrase "indecomposable element," which is as Hibernian as "necessary and sufficient condition" (as if "condition" meant no more than *concomitant* and as [if] *needful* were not the proper accompaniment of "sufficient"). But I have used it because I do not mean simply *element*. Logical analysis is not an analysis into existing elements. It is the tracing out of relations between concepts on the assumption that along with each given or found concept is given its negative, and every other relation resulting from a transposition of its correlates. The latter postulate amounts to merely identifying each correlate and distinguishing it from the others without recognizing any serial order among them. Thus to love and to be loved are regarded as the same concept, and not to love is also to be considered as the same concept. The combination of concepts is always by two at a time and consists in indefinitely identifying a subject of the one with a subject of the other, every correlate being regarded as a subject. Then if one concept can be accurately defined as a combination of others, and if these others are not of more complicated structure than the defined concept, then the defined concept is regarded as *ana-*

* From "The List of Categories A Second Essay," c. 1894. 300 and 301 precede 293 in the ms

† "The Basis of Pragmatism," Notebook I, c 1905

lyzed into these others. Thus A is grandparent of B, if and only if A is a parent of somebody who is a parent of B, therefore grandparent is analyzed into parent and parent. So step-parent, if taken as not excluding parentage, is analyzed into spouse and parent, and parent-in-law into parent and spouse.

295. These things being premised we may say in *primo*, there is no *a priori* reason why there should not be indecomposable elements of the phaneron which are what they are regardless of anything else, each complete in itself, provided, of course, that they be capable of composition. We will call these and all that particularly relates to them *Priman*. Indeed, it is almost inevitable that there should be such, since there will be compound concepts which do not refer to anything, and it will generally be possible to abstract from the internal construction that makes them compound, whereupon they become indecomposable elements.

296. In *secundo*, there is no *a priori* reason why there should not be indecomposable elements which are what they are relatively to a second but independently of any third. Such, for example, is the idea of otherness. We will call such ideas and all that is marked by them *Secundan* (*i e*, dependent on a second).

297. In *tertio* there is no *a priori* reason why there should not be indecomposable elements which are what they are relatively to a second and a third, regardless of any fourth. Such, for example, is the idea of *composition*. We will call everything marked by being a third or medium of connection, between a first and second anything, *tertian*.

• 298. It is *a priori* impossible that there should be an indecomposable element which is what it is relatively to a second, a third, and a fourth. The obvious reason is that that which
• combines two will by repetition combine any number¹. Nothing could be simpler; nothing in philosophy is more important.

299. We find then *a priori* that there are three categories of undecomposable elements to be expected in the phaneron: those which are simply positive totals, those which involve dependence but not combination, those which involve combination.

Now let us turn to the phaneron and see what we find in fact.

¹ Thus stated, the principle does not seem to extend to abnumerable multitudes. Yet it must extend to them because, after all, the abnumerable is defined by means of combinations of two, and indeed must be so, since there is no form of combination not reducible to that.

CHAPTER 2

THE CATEGORIES IN DETAIL

A. FIRSTNESS

§1. THE SOURCE OF THE CATEGORIES*

300 The *list of categories*, or as Harris,[†] the author of *Hermes*, called them, the "philosophical arrangements," is a table of conceptions drawn from the logical analysis of thought and regarded as applicable to being. This description applies not merely to the list published by me in 1867,[‡] and which I here endeavor to amplify, but also to the categories of Aristotle and to those of Kant. The latter have been more or less modified by different critics, as Renouvier, and still more profoundly by Hegel. My own list grew originally out of the study of the table of Kant.

301. I shall not here inquire how far it is justifiable to apply the conceptions of logic to metaphysics. For I hold the importance of that question, great as it is, to be perhaps secondary, and at any rate not paramount to that of the question what such conceptions would be. I may say, however, that in my own opinion, each category has to justify itself by an inductive examination which will result in assigning to it only a limited or approximate validity.

§2. THE MANIFESTATION OF FIRSTNESS§

302. The idea of First is predominant in the ideas of freshness, life, freedom. The free is that which has not another behind it, determining its actions; but so far as the idea of the negation of another enters, the idea of another enters; and

* From "The List of Categories. A Second Essay," c. 1894. 293 follows 301 in the ms.

† James Harris, in his *Philosophical Arrangements* (1775)

‡ See ch. 6

§ From "The List of Categories. A Second Essay, X," c. 1894

such negative idea must be put in the background, or else we cannot say that the Firstness is predominant. Freedom can only manifest itself in unlimited and uncontrolled variety and multiplicity, and thus the first becomes predominant in the ideas of measureless variety and multiplicity. It is the leading idea of Kant's "manifold of sense." But in Kant's synthetic unity the idea of Thirdness is predominant. It is an attained unity, and would better have been called totality, for that is the one of his categories in which it finds a home. In the idea of being, Firstness is predominant, not necessarily on account of the abstractness of that idea, but on account of its self-containedness. It is not in being separated from qualities that Firstness is most predominant, but in being something peculiar and idiosyncratic. The first is predominant in feeling, as distinct from objective perception, will, and thought.

§3. THE MONAD*

303. The pure idea of a *monad* is not that of an object. For an object is over against me. But it is much nearer an object than it is to a conception of self, which is still more complex. There must be some determination, or suchness, otherwise we shall think nothing at all. But it must not be an abstract suchness, for that has reference to a special suchness. It must be a special suchness with some degree of determination, not, however, thought as more or less. There is to be no comparison. So that it is a suchness *sui generis*. 'Imagine me to make and in a slumberous condition to have a vague, unobjectified, still less unsubjectified, sense of redness, or of salt taste, or of an ache, or of grief or joy, or of a prolonged musical note. That would be, as nearly as possible, a purely monadic state of feeling. Now in order to convert that psychological or logical conception into a metaphysical one, we must think of a metaphysical monad as a pure nature, or quality, in itself without parts or features, and without embodiment. Such is a pure monad. The meanings of names of "secondary" qualities are as good approximations to examples of monads as can be given.

* From "The List of Categories: A Second Essay," c. 1894. 303 follows 293 and is followed by 326 in the ms.

§1. QUALITIES OF FEELING*

301. . . . Among phanerons there are certain qualities of feeling, such as the color of magenta, the odor of attar, the sound of a railway whistle, the taste of quinine, the quality of the emotion upon contemplating a fine mathematical demonstration, the quality of feeling of love, etc. I do not mean the sense of actually experiencing these feelings, whether primarily or in any memory or imagination. That is something that involves these qualities as an element of it. But I mean the qualities themselves which, in themselves, are mere may-bes, not necessarily realized. The reader may be inclined to deny that. If so, he has not fully grasped the point that we are not considering what is true, not even what truly appears. I ask him to note that the word *red* means something when I say that the precession of the equinoxes is no more red than it is blue, and that it means just what it means when I say that aniline red is red. That mere *quality*, or suchness, is not in itself an occurrence, as seeing a red object is; it is a mere may-be. Its only being consists in the fact that there *might be* such a peculiar, positive, suchness in a phaneron. When I say it is a quality, I do not mean that it "inheres" in [a] subject. That is a phaneron peculiar to metaphysical thought, not involved in the sensation itself, and therefore not in the quality of feeling, which is entirely contained, or superseded, in the actual sensation. The Germans usually call these qualities feelings, feelings of *pleasure or pain*. To me this seems to be mere repetition of a tradition, never subjected to the test of observation. I can imagine a consciousness whose whole life, alike when wide awake and when drowsy or dreaming, should consist in nothing at all but a violet color or a stink of rotten cabbage. It is purely a question of what I can imagine and not of what psychological laws permit. The fact that I can imagine this, shows that such a feeling is not *general*, in the sense in which the law of gravitation is general. For nobody can imagine that law to have any being of any kind if it were impossible that there should exist any two masses of matter, or if there were no such things as motion. A true general cannot have any being unless there is to be some prospect of its sometime having occasion to be

* From "Logic viewed as Semeiotics, Introduction Number 2, Phaneroscopy," continuing 287.

embodied in a fact, which is itself not a law or anything like a law. A quality of feeling can be imagined to be without any occurrence, as it seems to me. Its mere may-being gets along without any realization at all.

§5. FEELING AS INDEPENDENT OF MIND AND CHANGE*

305. Suppose I begin by inquiring of you, Reader, in what particulars a feeling of redness or of purple without beginning, end, or change, or an eternally sounding and unvarying railway whistle, or a sempiternal thrill of joyous delight — or rather, such as would afford *us* delight, but supposed to be in that respect quite neutral — that should constitute the entire universe, would differ from a substance? I suppose you will tell me that no such thing could be alone in the universe because, firstly, it would require a mind to feel it, which would not be the feeling itself, secondly, the color or sound and probably also the thrill of delight would consist of vibrations; thirdly, none of them could last forever without a flow of time, fourthly, each would have a quality, which would be a determination in several respects, the color in hue, luminosity, chroma, and vividness, the sound in pitch, timbre (itself highly complex), loudness, and vividness, the delight more or less sensual, more or less emotional, more or less elevated, etc., and fifthly, each would require a physical substratum altogether disparate to the feeling itself. But I point out to you that these things are only known to us by extraneous experience, none of them are either seen in the color, heard in the sound, or felt in the visceral sensation. Consequently, there can be no logical difficulty in supposing them to be absent, and for my part, I encounter not the slightest psychological difficulty in doing so, either. To suppose, for example, that there is a flow of time, or any degree of vividness, be it high or low, seems to me quite as uncalled for as to suppose that there is freedom of the press or a magnetic field.

* From "An Apology for Pragmatism," intended for the January, 1907, *Monist*. See 4 540

§6. A DEFINITION OF FEELING*

306. By a feeling, I mean an instance of that kind of consciousness which involves no analysis comparison or any process whatsoever, nor consists in whole or in part of any act by which one stretch of consciousness is distinguished from another, which has its own positive quality which consists in nothing else, and which is of itself all that it is, however it may have been brought about; so that if this feeling is present during a lapse of time, it is wholly and equally present at every moment of that time. To reduce this description to a simple definition, I will say that by a feeling I mean an instance of that sort of element of consciousness which is all that it is positively, in itself, regardless of anything else

307. A feeling, then, is not an event, a happening, a coming to pass, since a coming to pass cannot be such unless there was a time when it had not come to pass; and so it is not in itself all that it is, but is relative to a previous state. A feeling is a *state*, which is in its entirety in every moment of time as long as it endures. But a feeling is not a single state which is other than an exact reproduction of itself. For if that reproduction is in the same mind, it must be at a different time, and then the being of the feeling would be relative to the particular time in which it occurred, which would be something different from the feeling itself, violating the definition which makes the feeling to be all that it is regardless of anything else. Or, if the reproduction were simultaneous with the feeling, it must be in another mind, and thus the identity of the feeling would depend upon the mind in which it was, which is other than the feeling, and again the definition would be violated in the same way. Thus any feeling must be identical with any exact duplicate of it, which is as much as to say that the feeling is simply a quality of immediate consciousness.

308. But it must be admitted that a feeling experienced in an outward sensation may be reproduced in memory. For to deny this would be idle nonsense. For instance, you experience, let us say a certain color sensation due to red light. It has a definite hue, luminosity, and chroma. The latter two elements — which are not separate in the feeling, it is true, and

* From *Lectures on the Philosophy of Language*, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 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are not, therefore, in the feeling at all, but are said to be in it, as a way of expressing the results which would follow, according to the principles of chromatics, from certain experiments with a color disk, color-box, or other similar apparatus. In that sense, the color sensation which you derive from looking at the red-lead has a certain hue, luminosity, and chroma which completely define the quality of the color. The *vividness*, however, is independent of all three of these elements; and it is very different in the memory of the color a quarter of a second after the actual sensation from what it is in the sensation itself, although this memory is conceivably perfectly true as to hue, luminosity, and chroma, which truth constitutes it an exact reproduction of the entire quality of the feeling.

309 It follows that since the *vividness* of a feeling — which would be more accurately described as the vividness of a consciousness of the feeling — is independent of every component of the quality of that consciousness, and consequently is independent of the resultant of those components, which resultant quality is the feeling itself. We thus learn what vividness is not, and it only remains to ascertain what else it is.

310 To this end two remarks will be useful. The first is that of whatever is in the mind in any mode of consciousness there is necessarily an immediate consciousness and consequently a feeling. The proof of this proposition is very instructive as to the nature of feeling; for it shows that, if by *psychology* we mean the positive, or observational, science of the mind or of consciousness, then although the entire consciousness at any one instant is nothing but a feeling, yet psychology can teach us nothing of the nature of feeling, nor can we gain knowledge of any feeling by introspection, the feeling being completely veiled from introspection, for the very reason that it is our immediate consciousness. Possibly this curious truth was what Emerson was trying to grasp — but if so, pretty unsuccessfully — when he wrote the lines,

The old Sphinx bit her thick lip —

Said, "Who taught thee me to name?"

I am thy spint, yoke-fellow,

Of thine eye I am eyebeam

“Thou art the unanswered question;
Couldst see thy proper eye,
Always it asketh, asketh;
And each answer is a lie.”

But whatever he may have meant, it is plain enough that all that is immediately present to a man is what is in his mind in the present instant. His whole life is in the present. But when he asks what is the content of the present instant, his question always comes too late. The present has gone by, and what remains of it is greatly metamorphosed. He can, it is true, recognize that he was at that time, for example, looking at a specimen of red-lead, and must have seen that color, which, he perceives, is something positive and *sui generis*, of the nature of feeling. But nobody's immediate consciousness, unless when he was much more than half asleep, ever consisted wholly of a color-sensation; and since a feeling is absolutely simple and without parts — as it evidently is, since it is whatever it is regardless of anything else, and therefore regardless of any part, which would be something other than the whole — it follows that if the red color-sensation was not the whole feeling of the instant it has nothing in common with the feeling of the instant. Indeed, although a feeling is immediate consciousness, that is, is whatever of consciousness there may be that is immediately present, yet there is no consciousness in it because it is instantaneous. For we have seen already that feeling is nothing but a quality, and a quality is not conscious: it is a mere possibility. We can, it is true, see what a feeling in general is like; that, for example, this or that red is a feeling, and it is perfectly conceivable that a being should have that color for its entire consciousness, throughout a lapse of time, and therefore at every instant of that time. But such a being could never know anything about its own consciousness. It could not think anything that is expressible as a proposition. It could have no idea of such a thing. It would be confined to feeling that color. Thus, if you perceive that you must at the instant in question have been looking at a given specimen of red-lead, you know that that color has some resemblance to your feeling at that instant. But this only means that when the feeling gives place to comparison this resemblance appears

But there is no resemblance at all in feeling, since feeling is whatever it is, positively and regardless of anything else, while the resemblance of anything lies in the comparison of that thing with something else.

311. Every operation of the mind, however complex, has its absolutely simple feeling, the emotion of the *tout ensemble*. This is a secondary feeling or sensation excited from within the mind, just as the qualities of outward sense are excited by something psychic without us. It seems at first glance unaccountable that a mere slight difference in the speed of vibration should make such a difference of quality as that between deep vermilion and violet blue. But then it is to be remembered that it is doubtless our imperfect knowledge of those vibrations which has led us to represent them abstractly as differing only in quantity. There is already a hint in the behavior of electrons that a lower speed and a greater one have differences which we have not been aware of. People wonder, too, how dead matter can excite feelings in the mind. For my part, instead of wondering how it can be, I feel much disposed to deny downright that it is possible. These new discoveries have reminded us how very little we know of the constitution of matter, and I prefer to guess that it is a psychic feeling of red-without us which arouses a sympathetic feeling of red in our senses.

§7. THE SIMILARITY OF FEELINGS OF DIFFERENT SENSORY MODES*

312. One of the old Scotch psychologists, whether it was Dugald Stewart or Reid† or which other matters naught, mentions, as strikingly exhibiting the disparateness of different senses, that a certain man blind from birth asked of a person of normal vision whether the color scarlet was not something like the blare of a trumpet; and the philosopher evidently expects his readers to laugh with him over the incongruity of the notion. But what he really illustrates much more strikingly is the dullness of apprehension of those who, like himself, had only the conventional education of the eighteenth century and remained wholly uncultivated in comparing ideas that in their matter

* From "Definition," 1910

† Reid, *Inquiry into the Human Mind*, ch 6, sec. II. But cf. Locke's *Ess.*, bk II, ch 4, §5

are very unlike. For everybody who has acquired the degree of susceptibility which is requisite in the more delicate branches of reasoning—those kinds of reasoning which our Scotch psychologist would have labelled "*Intuitions*" with a strong suspicion that they were delusions—will recognize at once so decided a likeness between a luminous and extremely chromatic scarlet, like that of the iodide of mercury as commonly sold under the name of scarlet [and the blare of a trumpet] that I would almost hazard a guess that the form of the chemical oscillations set up by this color in the observer will be found to resemble that of the acoustical waves of the trumpet's blare. I am only deterred from doing so by its being apparently true that our sense of hearing is entirely analytic; so that we are totally deaf to the wave of sound as it exists, and only hear the harmonic components regardless of the phases at which vibrations of commensurable lengths are combined.

§8. PRESENTMENTS AS SIGNS*

313. A mere presentment may be a sign. When the traditional blind man said he thought scarlet must be something like the sound of a trumpet, he had caught its blatancy very well, and the sound is certainly a presentment, whether the color¹ is so or not. Some colors are called gay, others sad. The sentiment of tones is even more familiar, that is, tones are signs of visceral qualities of feeling. But the best example is that of odors, for these are signs in more than one way. It is a common observation that odors bring back old memories. This I think must be due, in part at least, to the fact that, whether from the peculiar connection of the olfactory nerve with the brain or from some other cause, odors have a remarkable tendency to

* From "The Basis of Pragmatism," Notebook II, c 1905

¹ "As to colors, there is a somewhat serious difficulty in regarding them as presentments, because we cannot regard them as simple elements as long as they are contaminated with space-extension, which is something easily distinguishable and is also plainly not *priman*, since the space cannot of its nature be limited. Now the color not only cannot be dissociated from space, but it cannot even be prescinded from it. It can only be distinguished from it. We may, however, neglect the spatial element, and so reduce its emphasis indefinitely, and I am inclined to think that somehow colors may be regarded as presentments, though I cannot very clearly thread my way through the difficulty."—From "The Basis of Pragmatism," Notebook I, c 1905

presentmentate themselves, that is to occupy the entire field of consciousness, so that one almost lives for the moment in a world of odor. Now in the vacuity of this world, there is nothing to obstruct the suggestions of association. That is one way, namely by contiguous association, in which odors are particularly apt to act as signs. But they also have a remarkable power of calling to mind mental and spiritual qualities. This must be an effect of resemblance-association, if under resemblance-association we include all *natural* associations of different ideas. I certainly would do this, for I do not know what else resemblance can consist in.

A lady's favorite perfume seems to me somehow to agree with that of her spiritual being. If she uses none at all her nature will lack perfume. If she wears violet she herself will have the very same delicate fineness. Of the only two I have known to use rose, one was an artistic old virgin, a *grande dame*, the other a noisy young matron and very ignorant, but they were strangely alike. As for those who use heliotrope, frangipanni, etc., I know them as well as I desire to know them. Surely there must be some subtle resemblance between the odor and the impression I get of this or that woman's nature.

§9. THE COMMUNICABILITY OF FEELINGS*

✓ 314 Philosophers, who very properly call all things into question, have asked whether we have any reason to suppose that red looks to one eye as it does to another. I answer that slight differences there may be, but [consider the blind man imagining] red to resemble the blare of a trumpet. He had collected that notion from hearing ordinary people converse together about colors, and since I was not born to be one of those whom he had heard converse, the fact that I can see a certain analogy, shows me not only that my feeling of redness is something like the feelings of the persons whom he had heard talk, but also his feeling of a trumpet's blare was very much like mine. I am confident that a bull and I feel much alike at the sight of a red rag. As for the senses of my dog, I must confess that they seem very unlike my own, but when I reflect to how small a degree he thinks of visual images, and of how *snells*

* An undelivered (?) passage in Lecture IV of the "Lectures on Pragmatics," 1903

play a part in his thoughts and imaginations analogous to the part played by *sights* in mine, I cease to be surprised that the perfume of roses or of orange flowers does not attract his attention at all and that the effluvia that interest him so much, when at all perceptible to me, are simply unpleasant. He does not think of smells as sources of pleasure and disgust but as sources of information, just as I do not think of blue as a nauseating color, nor of red as a maddening one. I know very well that my dog's musical feelings are quite similar to mine though they agitate him more than they do me. He has the same emotions of affection as I, though they are far more moving in his case. You would never persuade me that my horse and I do not sympathize, or that the canary bird that takes such delight in joking with me does not feel with me and I with him; and this instinctive confidence of mine that it is so, is to my mind evidence that it really is so. My metaphysical friend who asks whether we can ever enter into one another's feelings — and one particular sceptic whom I have in mind is a most exceptionally sympathetic person, whose doubts are born of her intense interest in her friends — might just as well ask me whether I am sure that red looked to me yesterday as it does today and that memory is not playing me false. I know experimentally that sensations do vary slightly even from hour to hour, but in the main the evidence is ample that they are common to all beings whose senses are sufficiently developed.

- 315 I hear you say "All that is not *fact*; it is poetry." Nonsense! Bad poetry is false, I grant; but nothing is truer than true poetry. And let me tell the scientific men that the artists are much finer and more accurate observers than they are, except of the special minutiae that the scientific man is looking for.

316. I hear you say: "This smacks too much of an anthropomorphic conception." I reply that every scientific explanation of a natural phenomenon is a hypothesis that there is something in nature to which the human reason is analogous; and that it really is so all the successes of science in its applications to human convenience are witnesses. They proclaim that truth over the length and breadth of the modern world. In the light of the successes of science to my mind there is a degree of baseness in denying our birthright as children of God and in

shamefacedly slinking away from anthropomorphic conceptions of the universe

§10. TRANSITION TO SECONDNESS*

317. The whole content of consciousness is made up of qualities of feeling, as truly as the whole of space is made up of points or the whole of time of instants.

318 Contemplate anything by itself — anything whatever that can be so contemplated. Attend to the whole and drop the parts out of attention altogether. One can approximate nearly enough to the accomplishment of that to see that the result of its perfect accomplishment would be that one would have in his consciousness at the moment nothing but a quality of feeling. This quality of feeling would in itself, as so contemplated, have no parts. It would be unlike any other such quality of feeling. In itself, it would not even resemble any other, for resemblance has its being only in comparison. It would be a pure *priman*. Since this is true of whatever we contemplate, however complex may be the object, it follows that there is nothing else in immediate consciousness. To be-conscious is nothing else than to feel.

319 What room, then, is there for *secundans* and *tertians*? Was there some mistake in our demonstration that they must also have their places in the phaneron? No, there was no mistake. I said that the phaneron is made up entirely of qualities of feeling as truly as space is entirely made up of points. There is a certain *protoidal* aspect — I coin the word for the need — under which space is truly made up of nothing but points. Yet it is certain that no collection of points — using the word collection to mean merely a plural, without the idea of the objects being brought together — no collection of points, no matter how abnumerable its multitude, can in itself constitute space.

320 The phaneron does contain genuine *secundans*. Standing on the outside of a door that is slightly ajar, you put your hand upon the knob to open and enter it. You experience an unseen, silent resistance. You put your shoulder against the door and, gathering your forces, put forth a tremendous effort. Effort supposes resistance. Where there is no effort there is no resistance, where there is no resistance there is no effort either.

* From "Pragmatism," Fragment 2, c 1910.

in this world or any of the worlds of possibility. It follows that an effort is not a feeling nor anything *priman* or protoidal. There are feelings connected with it. they are the sum of consciousness during the effort. But it is conceivable that a man should have it in his power directly to summon up all those feelings, or any feelings. He could not, in any world, be endowed with the power of summoning up an effort to which there did not happen to be a resistance all ready to exist. For it is an absurdity to suppose that a man could directly will to oppose that very will. A very little thinking will show that this is what it comes to. According to such psychological analysis as I can make, effort is a phenomenon which only arises when one feeling abuts upon another in time, and which then always arises. But my psychological pretensions are little, if they exist at all, and I only mention my theory in order that contrast should impress the reader with the irrelevancy of psychology to our present problem, which is to say of what sort that is which is in our minds when we make an effort and which constitutes it an effort.

321. We live in two worlds, a world of fact and a world of fancy. Each of us is accustomed to think that he is the creator of his world of fancy; that he has but to pronounce his fiat, and the thing exists, with no resistance and no effort, and although this is so far from the truth that I doubt not that much the greater part of the reader's labor is expended on the world of fancy, yet it is near enough the truth for a first approximation. For this reason we call the world of fancy the internal world, the world of fact the external world. In this latter we are masters, each of us, of his own voluntary muscles, and of nothing more. But man is sly, and contrives to make this little more than he needs. Beyond that, he defends himself from the angles of hard fact by clothing himself with a garment of contentment and of habituation. Were it not for this garment, he would every now and then find his internal world rudely disturbed and his fiats set at naught by brutal inroads of ideas from without. I call such forcible modification of our ways of thinking the influence of the world of fact or *experience*. But he patches up his garment by guessing what those inroads are likely to be and carefully excluding from his internal world every idea which is likely to be so disturbed. Instead of wait-

ing for experience to come at untoward times, he provokes it when it can do no harm and changes the government of his internal world accordingly.

B SECONDNESS

§1. FEELING AND STRUGGLE*

322. The second category that I find, the next simplest feature common to all that comes before the mind, is the element of struggle

This is present even in such a rudimentary fragment of experience as a simple feeling. For such a feeling always has a degree of vividness, high or low, and this vividness is a sense of commotion, an action and reaction, between our soul and the stimulus. If, in the endeavor to find some idea which does not involve the element of struggle, we imagine a universe that consists of a single quality that never changes, still there must be some degree of steadiness in this imagination, or else we could not think about and ask whether there was an object having any positive suchness. Now this steadiness of the hypothesis that enables us to think about it — and to mentally manipulate it — which is a perfectly correct expression, because our thinking about the hypothesis really consists in making experiments upon it — this steadiness, I say, consists in this, that if our mental manipulation is delicate enough, the hypothesis will resist being changed. Now there can be no resistance where there is nothing of the nature of struggle or forceful action. By struggle I must explain that I mean mutual action between two things regardless of any sort of third or medium, and in particular regardless of any law of action.

323. I should not wonder if somebody were to suggest that perhaps the idea of a law is essential to the idea of one thing acting upon another. But surely that would be the most untenable suggestion in the world considering that there is no one of us who after lifelong discipline in looking at things from the necessitarian point of view† has ever been able to train himself to dismiss the idea that he can perform any specifiable act of

* From "Lectures on Pragmatism," II, First Draught, c. 1903

† See vol 6, bk I, ch 2

the will. It is one of the most singular instances of how a pre-conceived theory will blind a man to facts that many necessitarians seem to think that nobody really believes in the freedom of the will, the fact being that he himself believes in it when he is not theorizing. However, I do not think it worth while to quarrel about that. Have your necessitarianism if you approve of it, but still I think you must admit that no law of nature makes a stone fall, or a Leyden jar to discharge, or a steam engine to work.

§2. ACTION AND PERCEPTION*

324. [There is a category] which the rough and tumble of life renders most familiarly prominent. We are continually bumping up against hard fact. We expected one thing, or passively took it for granted, and had the image of it in our minds, but experience forces that idea into the background, and compels us to think quite differently. You get this kind of consciousness in some approach to purity when you put your shoulder against a door and try to force it open. You have a sense of resistance and at the same time a sense of effort. There can be no resistance without effort; there can be no effort without resistance. They are only two ways of describing the same experience. It is a double consciousness. We become aware of ourself in becoming aware of the not-self. The waking state is a consciousness of reaction, and as the consciousness *itself* is two-sided, so it has also two varieties, namely, action, where our modification of other things is more prominent than their reaction on us, and perception, where their effect on us is overwhelmingly greater than our effect on them. And this notion, of being such as other things make us, is such a prominent part of our life that we conceive other things also to exist by virtue of their reactions against each other. The idea of other, of *not*, becomes a very pivot of thought. To this element I give the name of Secondness.

§3. THE VARIETIES OF SECONDNESS†

- 325. The idea of second is predominant in the ideas of causation and of statical force. For cause and effect are two;

* From "Lowell Lectures of 1903" Lecture III, vol. 1, 3d Draught. See 343.

† Unidentified fragment.

and statical forces always occur between pairs. Constraint is a Secondness. In the flow of time in the mind, the past appears to act directly upon the future, its effect being called memory, while the future only acts upon the past through the medium of thirds. Phenomena of this sort in the outward world shall be considered below. In sense and will, there are reactions of Secondness between the *ego* and the *non-ego* (which non-ego may be an object of direct consciousness). In will, the events leading up to the act are internal, and we say that we are agents more than patients. In sense, the antecedent events are not within us; and besides, the object of which we form a perception (though not that which immediately acts upon the nerves) remains unaffected. Consequently, we say that we are patients, not agents. In the idea of reality, Secondness is predominant, for the real is that which insists upon forcing its way to recognition as something *other* than the mind's creation. (Remember that before the French word, *second*, was adopted into our language, *other* was merely the ordinal numeral corresponding to *two*.) The real is active, we acknowledge it, in calling it the *actual*. (This word is due to Aristotle's use of *ἐνέργεια*, action, to mean existence, as opposed to a mere germinal state.) Again, the kind of thought of those dualistic philosophers who are fond of laying down propositions as if there were only two alternatives, and no gradual shading off between them, as when they say that in trying to find a law in a phenomenon I commit myself to the proposition that law bears absolute sway in nature, such thought is marked by Secondness.

§4. THE DYAD*

326. A *dyad* consists of two *subjects* brought into oneness. These subjects have their modes of being in themselves, and they also have their modes of being, as first and second, etc., in connection with each other. They are two, if not really, at least in aspect. There is also some sort of union of them. The dyad is not the subjects, it has the subjects as one element of it. It has, besides, a suchness of monoidal character, and it has suchness, or suchnesses, peculiar to it as a dyad. The dyad brings the subjects together, and in doing so imparts a char-

* From "The List of Categories: A Second Essay," continuing 303

acter to each of them. Those characters are, in some sense, two. The dyad has also two sides according to which subject is considered as first. These two sides of the dyad form a second pair of subjects attached to the dyad; and they have their mode of union. Each of them also has a special character as a subject of the dyad.

This description shows that the dyad, in contrast to the monad, has a variety of features; and all these features present dyadic relations.

327. As an example of a dyad take this: God said, Let there be light, and there was light. We must not think of this as a verse of Genesis, for Genesis would be a third thing. Neither must we think of it as proposed for our acceptance, or as held for true; for we are third parties. We must simply think of God creating light by fiat. Not that the fiat and the coming into being of the light were two facts; but that it is in one indivisible fact. God and light are the subjects. The act of creation is to be regarded, not as any third object, but merely as the suchness of connection of God and light. The dyad is the fact. It determines the existence of the light, and the creatorship of God. The two aspects of the dyad are, first, that of God compelling the existence of the light, and that of the light as, by its coming into existence, making God a creator. This last is in the present example merely a mere point of view, without any reality corresponding to it. That is one of the special features of the particular example chosen. Of the two aspects of the dyad, then, one is in this instance, fundamental, real, and primary, while the other is merely derivative, formal, and secondary.

328. I chose this instance because it is represented as instantaneous. Had there been any process intervening between the causal act and the effect, this would have been a medial, or third, element. Thirdness, in the sense of the category, is the same as mediation. For that reason, pure dyadism is an act of arbitrary will or of blind force; for if there is any reason, or law, governing it, that mediates between the two subjects and brings about their connection. The dyad is an individual fact, as it existentially is; and it has no generality in it. The being of a monadic quality is a mere potentiality, without existence. Existence is purely dyadic.

329 ' It is to be noted that existence is an affair of blind force "The very hyssop that grows on the wall exists in that chink because the whole universe could not prevent it" No law determines any atom to exist Existence is presence in some experiential universe — whether the universe of material things now existing, or that of laws, or that of phenomena, or that of feelings — and this presence implies that each existing thing is in dynamical reaction with every other in that universe Existence, therefore, is dyadic; though Being is monadic.

§5. POLAR DISTINCTIONS AND VOLITION*

330 Calling any distinction between two equally decided characters to which no third seems to be coordinate (although a neutrality separates them) a *polar* distinction, in the external world polar distinctions are few That of past and future, with the resulting two ways of passing over a line (and consequent right-and left-handed spirals and helices, whence probably the magnetic and possibly the electric poles — supposing the latter to be truly "polar" in our sense), with the right and left sides of our bodies, and the two sexes, seems pretty much to exhaust the list of them Yet for the much smaller universe of psychology, polar distinctions abound, most of them referring to volition Thus, pleasure is any kind of sensation that one immediately seeks, pain any that one immediately shuns Right and wrong are expressly volitional Necessity and impossibility so obviously refer to volition that the words often need qualification to show that rational modifications of them are meant The words reasonable and perverse imply that assent is as free as choice ever is, and so proclaim their volitional strain Roget's *Thesaurus* illustrates the great aptitude of the psychical to *polar* distinction Any very close examination of how far this is due to volition would cause us to wander quite away from the subject of this essay It would show that dichotomy, meaning the fact that the elements that a distinction separates are just *two* in number, is strikingly often — perhaps that it is presumably always — due to volition . .

331 Although the mode of consciousness we call volition, or willing, contrasts decidedly with the mere perception that something has been done, yet it is not perfected, and perhaps

* Unidentified fragment.

does not take place at all, until something is actually effected. Trying to shove something too heavy for the man to stir nevertheless accomplishes, in considerable measure, the only thing that he directly willed to do — namely, to contract certain muscles. In the days of table-turning we used to be commanded to sit quite away from a table, and “*with all our might*” to will that the table should move, and since the whole weight of our outstretched arms soon made our finger-tips unconsciously numb (for things are not apt to be consciously unconscious; and there were other concurring physiological effects that we did not suspect), while we were possessed of no other “*might*” over the table than through our muscles, we used to be speedily rewarded, by a direct consciousness of willing that the table move, accompanied by the vision of its wondrous obedience. Until it moved, we were only *longing*, not *willing*. So when certain psychologists write, chiefly in French — a language abounding in exquisite distinctions, but one in which any analytical method of interpretation is so sure to lead to misunderstandings, that the language is not well adapted to psychology or philosophy — about “*involuntary attention*,” they can only mean one of two things, either *unpremeditated* attention or attention influenced by conflicting *desires*. Though “*desire*” implies a tendency to volition, and though it is a natural hypothesis that a man cannot *will* to do that which he has no sort of desire to do, yet we all know conflicting desires but too well, and how treacherous they are apt to be, and a desire may perfectly well be discontented with volition, *i e.*, with what the man *will* do. The consciousness of that truth seems to me to be the root of our consciousness of free will. — “*Involuntary attention*” involves in correct English a contradiction *in adjecto*.

§6. EGO AND NON-EGO*

332. The triad, feeling, volition, cognition, is usually regarded as a purely psychological division. Long series of carefully planned self-experiments, persistent and much varied, though only qualitative, have left me little doubt, if any, that there are in those elements three quite disparate modes of awareness. That is a psychological proposition; but that which

* From “Phaneroscopy or the Natural History of Concepts,” c. 1905.

now concerns us is not psychological, particularly, namely the differences between that of which we are aware in feeling, volition, and cognition. Feeling is a quality, but so far as there is mere feeling, the quality is not limited to any definite subject. We hear of a man whose mind is jaundiced. That phrase well expresses feeling without reason. Feeling also as such is unanalyzed.^v Volition is through and through dual. There is the duality of agent and patient, of effort and resistance, of active effort and inhibition, of acting on self and on external objects. Moreover, there is active volition and passive volition, or inertia, the volition of reform and the volition of conservatism. That shock which we experience when anything particularly unexpected forces itself upon our recognition (which has a cognitive utility as being a call for explanation of the presentment), is simply the sense of the volitional inertia of expectation, which strikes a blow like a water-hammer when it is checked; and the force of this blow, if one could measure it, would be the measure of the energy of the conservative volition that gets checked. Low grades of this shock doubtless accompany all unexpected perceptions; and every perception is more or less unexpected. Its lower grades are, as I opine, not without experimental tests of the hypothesis, that sense of externality, of the presence of a *non-ego*, which accompanies perception generally and helps to distinguish it from dreaming. This is present in all sensation, meaning by sensation the initiation of a state of feeling,—for by feeling I mean nothing but sensation *minus* the attribution of it to any particular subject. In my use of words, when an ear-splitting, soul-bursting locomotive whistle starts, there is a sensation, which ceases when the screech has been going on for any considerable fraction of a minute, and at the instant it stops there is a second sensation. Between them there is a state of feeling.

333 As for pleasure and pain, which Kant and others have represented to be of the essence of feeling, whether it be merely because they and the section of the psychological world for which at this moment I have the presumption to speak apply the word feeling to different modifications of awareness, or whether there be a faulty analysis on the one part or the other, we certainly do not think that unadulterated feeling, if that element could be isolated, would have any relation to pain or

to pleasure. For in our opinion if there be any quality of feeling common to all pleasurable experiences or components of experience, and another one quality of feeling common to all that is painful (which we are inclined to doubt, to say the least), then we hold the opinion that the one is the feeling of being attracted, the other that of being repelled, by the present state of experience. If there be two such feelings, they are feelings of states of volition. But perhaps pleasure and pain are nothing more than names for the state of being attracted and that of being repelled by present experience. Of course, feelings accompany them, but under the latter hypothesis no feeling would be common to all pleasures, and none to all pains. If we are right, the position of the hedonists is preposterous, in that they make mere feelings to be active agencies, instead of being merely conscious indications of real determinations of our subconscious volitional beings [I may mention that their *talk* (however it may be with their thought) is further preposterous as seeming to make pain a mere privation of pleasure, although it is plain that it is pain that indicates an active, and pleasure only a passive, determination of our volitional being.]

334. As for volition, I would limit the term in one way and extend it in another. I would limit it to the momentary direct dyadic consciousness of an *ego* and a *non-ego* then and there present and reacting each upon the other. In one, the action is generally more active, in the other more passive, but precisely - what this difference consists in I do not feel sure. I think, however, that the will to produce a change is active, the will to resist a change is passive. All sensation is essentially, by its very definition, active. The objection to this is that, according to it, the voluntary inhibition of a reflex should not give a sense of effort; and probably the definition of the distinction between the sense of externality in willing and in perception requires a supplement or other slight modification on this account. But the important point [is] that the sense of externality in perception consists in a sense of powerlessness before the overwhelming force of perception. Now the only way in which any force can be learned is by something like trying to oppose it. That we do something like this is shown by the shock we receive from any unexpected experience. It is the inertia of the mind, which tends to remain in the state in which it is. No doubt

there is a marked difference between the active and intentional volition of muscular contraction and the passive and unintentional volition that gives the shock of surprise and the sense of externality. But the two are to be classed together as alike modes of double consciousness, that is, of awareness, at once and in the same awareness, of an *ego* and a *non-ego* . . .

§7. SHOCK AND THE SENSE OF CHANGE*

335. Some writers insist that all experience consists in sense-perception, and I think it is probably true that every element of experience is in the first instance applied to an external object. A man who gets up out of the wrong side of the bed, for example, attributes wrongness to almost every object he perceives. That is the way in which he experiences his bad temper. It cannot, however, be said that he *perceives* the perversity which he wrongly attributes to outward objects.

336. We perceive objects brought before us, but that which we especially experience — the kind of thing to which the word “experience” is more particularly applied — is an event. We cannot accurately be said to perceive events, for this requires what Kant called the “synthesis of apprehension,” not however, by any means, making the needful discriminations. A whistling locomotive passes at high speed close beside me. As it passes the note of the whistle is suddenly lowered from a well-understood cause. I perceive the whistle, if you will. I have, at any rate, a sensation of it. But I cannot be said to have a sensation of the change of note. I have a sensation of the lower note. But the cognition of the change is of a more intellectual kind. That I experience rather than perceive. It is [the] special field of experience to acquaint us with events, with changes of perception. Now that which particularly characterizes sudden changes of perception is a *shock*. A shock is a volitional phenomenon. The long whistle of the approaching locomotive, however disagreeable it may be, has set up in me a certain inertia, so that the sudden lowering of the note meets with a certain resistance. That must be the fact, because if there were no such resistance there could be no shock when the change of note occurs. Now this shock is quite unmistakable. It is more particularly to changes and contrasts

* Ibid

of perception that we apply the word "experience." We experience vicissitudes, especially. We cannot experience the vicissitude without experiencing the perception which undergoes the change; but the concept of *experience* is broader than that of *perception*, and includes much that is not, strictly speaking, an object of perception. It is the compulsion, the absolute constraint upon us to think otherwise than we have been thinking that constitute experience. Non constraint and compulsion cannot exist without resistance, and resistance is effort opposing change. Therefore there must be an element of effort in experience, and it is this which gives it its peculiar character. But we are so disposed to yield to it as soon as we can detect it, that it is extremely difficult to convince ourselves that we have exerted any resistance at all. It may be said that we hardly know it except through the axiom that there can be no force where there is no resistance or inertia. Whoever may be dissatisfied with my statement will do well to sit down and cipher out the matter for himself. He may be able to formulate the nature of the oppositional element in experience, and its relation to ordinary volition better than I have done, but that there is an oppositional element in it, logically not easily distinguished from volition, will, I make no doubt at all, be his ultimate conclusion.

C. THIRDNESS

§1. EXAMPLES OF THIRDNESS*

337. By the third, I mean the medium or connecting bond between the absolute first and last. The beginning is first, the end second, the middle third. The end is second, the means third. The thread of life is a third; the fate that snips it, its second. A fork in a road is a third, it supposes three ways, a straight road, considered merely as a connection between two places is second, but so far as it implies passing through intermediate places it is third. Position is first, velocity or the relation of two successive positions second, acceleration or the relation of three successive positions third. But velocity in so far as it is continuous also involves a third. Continuity repre-

* Fragment, "Third," c. 1875.

sents Thirdness almost to perfection. Every process comes under that head. Moderation is a kind of Thirdness. The positive degree of an adjective is first, the superlative second, the comparative third. All exaggerated language, "supreme," "utter," "matchless," "root and branch," is the furniture of minds which think of seconds and forget thirds. Action is second, but conduct is third. Law as an active force is second, but order and legislation are third. Sympathy, flesh and blood, that by which I feel my neighbor's feelings, is third.

§2. REPRESENTATION AND GENERALITY*

338. The ideas in which Thirdness is predominant are, as might be expected, more complicated, and mostly require careful analysis to be clearly apprehended, for ordinary, unenergetic thought slurs over this element as too difficult. There is all the more need of examining some of these ideas.

339. The easiest of those which are of philosophical interest is the idea of a sign, or representation.† A sign stands *for* the idea which it produces, or modifies. Or, it is a vehicle conveying into the mind something from without for which it stands is called its *object*, that which it signifies its *meaning*, and the idea to which it gives rise, its *significate*. The object of representation can be nothing but the representation of which the first representation is the inter-

But an endless series of representations, each representing the one behind it, may be conceived to have an ultimate object at its limit. The meaning of a representation can be nothing but a representation. In fact, it is nothing but a representation itself conceived as stripped of irrelevant details. But this clothing never can be completely stripped off. It is only changed for something more diaphanous. So there is an infinite regression here. Finally, the interpretant is but another representation to which the torch of interpretation is handed along, and as representation, it has its interpretant again. Lo, another infinite series.

Some of the ideas of prominent Thirdness which, in their great importance in philosophy and in science, are from an unidentified fragment, 340-2 are from a fragment,

require attentive study are generality, infinity, continuity, diffusion, growth, and intelligence.

341. Let us examine the idea of generality. Every cook has in her recipe-book a collection of rules, which she is accustomed to follow. An apple pie is desired. Now, observe that we seldom, probably never, desire a single individual thing. What we want is something which shall produce a certain pleasure of a certain kind. To speak of a single individual pleasure is to use words without meaning. We may have a single experience of pleasure; but the pleasure itself is a quality. Experiences are single, but qualities, however specialized, cannot be enumerated. There are some two dozen kinds of metals well known to me. I remember to have examined lumps of those qualities. But it is only the limitation of experience which attaches that number, there is simply no end to the metallic qualities I can imagine. I can imagine an infinite variety between tin and lead, or between copper and silver, or between iron and nickel, or between magnesium and aluminum. An apple pie, then, is desired — a good apple pie, made of fresh apples, with a crust moderately light and somewhat short, neither too sweet nor too sour, etc. But it is not any particular apple pie, for it is to be made for the occasion; and the only particularity about it is that it is to be made and eaten today. For that, apples are wanted, and remembering that there is a barrel of apples in the cellar, the cook goes to the cellar and takes the apples that are uppermost and handiest. That is an example of following a general rule. She is directed to take apples. Many times she has seen things which were called apples, and has noticed their common quality. She knows how to find such things now; and as long as they are sound and fine, any apples will do. What she desires is something of a given quality; what she has to take is this or that particular apple. From the nature of things, she cannot take the quality but must take the particular thing. Sensation and volition being affairs of action and reaction relate to particular things. She has seen only particular apples, and can take only particular apples. But desire has nothing to do with particulars; it relates to qualities. Desire is not a reaction with reference to a particular thing, it is an idea about an idea, namely, the idea of how delightful it would be for me, the cook's master,

to eat an apple pie. However, what is desired is not a mere unattached quality, what is desired is that the dream of eating an apple pie should be realized in Me, and this Me is an object of experience. So with the cook's desire She has no particular apple pie she particularly prefers to serve; but she does desire and intend to serve an apple pie to a particular person. When she goes into the cellar for the apples, she takes whatever bowl or basket comes handy, without caring what one, so long as it has a certain size, is clean, and has other qualities, but having once selected it, into that particular bowl she intends to put some apples. She takes any apples that are handy and seem good, but having taken them she means to make a pie of those apples. If she chances to see some others in the kitchen, on her return from the cellar, she will not use them for the pie, unless for some reason she changes her mind. Throughout her whole proceedings she pursues an idea or dream without any particular thisness or thatness — or, as we say, *hecceity* — to it, but this dream she wishes to realize in connection with an object of experience, which as such, does possess hecceity, and since she has to act, and action only relates to this and that, she has to be perpetually making random selections, that is, taking whatever comes handiest.

342. The dream itself has no prominent thirdness, it is, on the contrary, utterly irresponsible, it is whatever it pleases. The object of experience as a reality is a second. But the desire in seeking to attach the one to the other is a third, or medium.

So it is with any law of nature. Were it but a mere idea unrealized — and it is of the nature of an idea — it would be a pure first. The cases to which it applies, are seconds.

§3. THE REALITY OF THIRDNESS*

343 . . . It is impossible to resolve everything in our thoughts into those two elements [of Firstness and Secondness]. We may say that the bulk of what is actually done consists of Secondness — or better, Secondness is the predominant character of what *has been* done. The immediate present, could we seize it, would have no character but its Firstness. Not that I mean to say that immediate consciousness (a pure fiction, by

* From the "Lowell Lectures of 1903," III, vol. 1, 3d Draught. See 324 and 521

the way), would be Firstness, but that the *quality* of what we are immediately conscious of, which is no fiction, is Firstness. But we constantly predict what is to be. Now what is to be, according to our conception of it, can never become wholly past. In general, we may say that *meanings* are inexhaustible. We are too apt to think that what one *means* to do and the *meaning* of a word are quite unrelated meanings of the word "meaning," or that they are only connected by both referring to some actual operation of the mind. Professor Royce especially in his great work *The World and the Individual* has done much to break up this mistake. In truth the only difference is that when a person *means* to do anything he is in some state in consequence of which the brute reactions between things will be moulded [in] to conformity to the form to which the man's mind is itself moulded, while the meaning of a word really lies in the way in which it might, in a proper position in a proposition believed, tend to mould the conduct of a person into conformity to that to which it is itself moulded. 'Not only will meaning always, more or less, in the long run, mould reactions to itself, but it is only in doing so that its own being consists. For this reason I call this element of the phenomenon or object of thought the element of Thirdness. It is that which is what it is by virtue of imparting a quality to reactions in the future.

344 There is a strong tendency in us all to be sceptical about there being any real meaning or law in things. This scepticism is strongest in the most masculine thinkers. I applaud scepticism with all my heart, provided it have four qualities: first, that it be sincere and real doubt; second, that it be aggressive; third, that it push inquiry, and fourth, that it stand ready to acknowledge what it now doubts, as soon as the doubted element comes clearly to light. To be angry with sceptics, who, whether they are aware of it or not, are the best friends of spiritual truth, is a manifest sign that the angry person is himself infected with scepticism — not, however, of the innocent and wholesome kind that tries to bring truth to light, but of the mendacious, clandestine, disguised, and conservative variety that is afraid of truth, although truth merely means the way to attain one's purposes. If the sceptics think that any account can be given of the phenomena of the universe while

they leave Meaning out of account, by all means let them go ahead and try to do it. It is a most laudable and wholesome enterprise. But when they go so far as to say that there is no such idea in our minds, irreducible to anything else, I say to them, "Gentlemen, your strongest sentiment, to which I subscribe with all my heart, is that a man worthy of that name will not allow petty intellectual predilections to blind him to truth, which consists in the conformity of his thoughts to his purposes. But you know there is such a thing as a defect of candor of which one is not oneself aware. You perceive, no doubt, that if there be an element of thought irreducible to any other, it would be hard, on your principles, to account for man's having it, unless he derived it from environing Nature. But if, because of that, you were to turn your gaze away from an idea that shines out clearly in your mind, you would be violating your principles in a very much more radical way."

345 I will sketch a proof that the idea of meaning is irreducible to those of quality and reaction. It depends on two main premisses. The first is that every genuine triadic relation involves meaning, as meaning is obviously a triadic relation. The second is that a triadic relation is inexpressible by means of dyadic relations alone. Considerable reflexion may be required to convince yourself of the first of these premisses, that every triadic relation involves meaning. There will be two lines of inquiry. First, all physical forces appear to subsist between pairs of particles. This was assumed by Helmholtz in his original paper, *On the Conservation of Forces*.^{*} Take any fact in physics of the triadic kind, by which I mean a fact which can only be defined by simultaneous reference to three things, and you will find there is ample evidence that it never was produced by the action of forces on mere dyadic conditions. Thus, your right hand is that hand which is toward the *east*, when you face the *north* with your head toward the *zenith*. Three things, east, west, and up, are required to define the difference between right and left. Consequently chemists find that those substances which rotate the plane of polarization to the right or left can only be produced from such [similar] active substances. They are all of such complex constitution

^{*} *Über die Erhaltung der Kraft, Einleitung* (1847). See 1889 ed. in Ostwald's "Klassiker d. E. W." series.

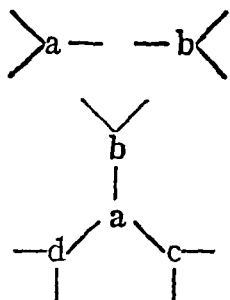
that they cannot have existed when the earth was very hot, and how the first one was produced is a puzzle. It cannot have been by the action of brute forces. For the second branch of the inquiry, you must train yourself to the analysis of relations, beginning with such as are very markedly triadic, gradually going on to others. In that way, you will convince yourself - thoroughly that every genuine triadic relation involves thought or *meaning*. Take, for example, the relation of *giving*. A gives B to C. This does not consist in A's throwing B away and its accidentally hitting C, like the date-stone, which hit the Jinnee in the eye. If that were all, it would not be a genuine triadic relation, but merely one dyadic relation followed by another. There need be no motion of the thing given. Giving is a transfer of the right of property. Now right is a matter of law, and law is a matter of thought and meaning. I there leave the matter to your own reflection, merely adding that, though I have inserted the word "genuine," yet I do not really think that necessary. I think even degenerate triadic relations involve something like thought.

346. The other premiss of the argument that genuine triadic relations can never be built of dyadic relations and of qualities is easily shown. In existential graphs, a spot with one tail —X represents a quality, a spot with two tails —R— a dyadic relation *. Joining the ends of two tails is also a dyadic relation. But you can never by such joining make a graph with three tails. You may think that a node connecting three lines of identity Y is not a triadic idea. But analysis will show that it is so. I see a man on Monday. On Tuesday I see a man, and I exclaim, "Why, that is the *very* man I saw on Monday." We may say, with sufficient accuracy, that I directly experienced the identity. On Wednesday I see a man and I say, "That is the same man I saw on Tuesday, and consequently is the same I saw on Monday." There is a recognition of triadic identity, but it is only brought about as a conclusion from two premisses, which is itself a triadic relation. If I see two men at once, I cannot by any such direct experience identify both of them with a man I saw before. I can only identify them if I regard them, not as the *very* same, but as two different manifestations of the same man. But the idea of

* See vol. 4, bk. II.

manifestation is the idea of a sign. Now a sign is something, A, which denotes some fact or object, B, to some interpretant thought, C

347 It is interesting to remark that while a graph with three tails cannot be made out of graphs each with two or one tail, yet combinations of graphs of three tails each will suffice to build graphs with every higher number of tails.



And analysis will show that every relation which is *tetradic*, *pentadic*, or of any greater number of correlates is nothing but a compound of triadic relations. It is therefore not surprising to find that beyond the three elements of Firstness, Secondness, and Thirdness, there is *nothing* else to be found in the phenomenon

348. As to the common aversion to recognizing *thought* as an active factor in the real world, some of its causes are easily traced. In the first place, people are persuaded that everything that happens in the material universe is a motion completely determined by inviolable laws of dynamics, and that, they think, leaves no room for any other influence. But the laws of dynamics stand on quite a different footing from the laws of gravitation, elasticity, electricity, and the like. The laws of dynamics are very much like logical principles, if they are not precisely that. They only say how bodies will move after you have said what the forces are. They permit any forces, and therefore any motions. Only, the principle of the conservation of energy requires us to explain certain kinds of motions by special hypotheses about molecules and the like. Thus, in order that the viscosity of gases should not disobey that law we have to suppose that gases have a certain molecular constitution. Setting dynamical laws to one side, then, as hardly being positive laws, but rather mere formal principles, we have only the laws of gravitation, elasticity, electricity, and chem-

istry. Now who will deliberately say that our knowledge of these laws is sufficient to make us reasonably confident that they are absolutely eternal and immutable, and that they escape the great law of evolution? Each hereditary character is a law, but it is subject to developement and to decay. Each habit of an individual is a law, but these laws are modified so easily by the operation of self-control, that it is one of the most patent of facts that ideals and thought generally have a very great influence on human conduct. That truth and justice are great powers in the world is no figure of speech, but a plain fact to which theories must accommodate themselves

‘349 The child, with his wonderful genius for *language*, naturally looks upon the world as chiefly governed by thought; for thought and expression are really one. As Wordsworth truly says, the child is quite right in this; he is an

“eye among the blind,

“On whom those truths do rest

“Which we are toiling all our lives to find.”

But as he grows up, he loses this faculty, and all through his childhood he has been stuffed with such a pack of lies, which parents are accustomed to think are the most wholesome food for the child — because they do not think of his future — that he begins real life with the utmost contempt for all the ideas of his childhood; and the great truth of the immanent power of thought in the universe is flung away along with the lies. I offer this hypothetical explanation because, if the common aversion to regarding thought as a real power, or as anything but a fantastic figment, were really natural, it would make an argument of no little strength against its being acknowledged as a real power.

§4. PROTOPLASM AND THE CATEGORIES*

350. Thus mathematical considerations, by which I mean study as purely *a priori* and necessary as thought can be, have suggested and indeed insisted upon a classification of the elements of the phaneron, and so of the functions of the mind, and of the nervous system, of protoplasm itself, which empirical science will find very convenient. Instead of the familiar division of Tetens or Kant which makes pleasure-pain, cognition,

* From an unidentified fragment.

and volition the three categories of mental phenomena, we have feeling or quality, the action of opposition, and synthetic thought

351 As to protoplasm, what the three *cenopythagorean* categories, as I call them, do, and what they are limited to doing, is to call attention to three very different characters of this chemical body. The first is a *posse* which it has in itself, for the *priman* stops at *can-bes* and never reaches to existence, which depends on interaction, or *secundantia*. This internal power which the category merely suggests, we recognize as that of feeling. Though it is *priman*, it is without any doubt dependent upon the extreme complexity of the protoplasmic molecule, if the word molecule can be applied to so intricate, unstable, and ununified a system. But it is the law of high numbers that extreme complication with a great multitude of independent similars results in a new simplicity. Next there is reactive force, a twoness, which is emphasized in the nerve cells together. It is the property by which any state of high cohesiveness tends to spread through the albuminoid matter. We usually call the property contractility. Thirdly, the categories suggest our looking for a synthesizing law, and thus we find in the power of assimilation, incident to which is the habit-taking faculty. This is all the categories pretend to do. They suggest a way of thinking, and the possibility of science depends upon the fact that human thought necessarily partakes of whatever character is diffused through the whole universe, and that its natural modes have some tendency to be the modes of action of the universe.

352 In the study of logic I have found the cenopythagorean categories unlock many a secret

§5. THE INTERDEPENDENCE OF THE CATEGORIES*

353 Perhaps it is not right to call these categories conceptions, they are so intangible that they are rather tones or tints upon conceptions. In my first attempt to deal with them,† I made use of three grades of separability of one idea from another. In the first place, two ideas may be so little allied

* From "One, Two, Three," c. 1880

† See ch. 6

that one of them may be present to the consciousness in an image which does not contain the other at all; in this way we can imagine *red* without imagining blue, and *vice versa*; we can also imagine sound without melody, but not melody without sound. I call this kind of separation *dissociation*. In the second place, even in cases where two conceptions cannot be separated in the imagination, we can often suppose one without the other, that is we can imagine data from which we should be led to believe in a state of things where one was separated from the other. Thus, we can suppose uncolored space, though we cannot dissociate space from color. I call this mode of separation *prescission*. In the third place, even when one element cannot even be supposed without another, they may oft-times be distinguished from one another. Thus we can neither imagine nor suppose a taller without a shorter, yet we can distinguish the taller from the shorter. I call this mode of separation *distinction*. Now, the categories cannot be dissociated in imagination from each other, nor from other ideas. The category of first can be prescinded from second and third, and second can be prescinded from third. But second cannot be prescinded from first, nor third from second. The categories may, I believe, be prescinded from any other one conception, but they cannot be prescinded from some one and indeed many elements. You cannot suppose a first unless that first be something definite and more or less definitely supposed. Finally, though it is easy to distinguish the three categories from one another, it is extremely difficult accurately and sharply to distinguish each from other conceptions so as to hold it in its purity and yet in its full meaning.

CHAPTER 3

*A GUESS AT THE RIDDLE**^P

PLAN OF THE WORK

354. Section 1. One, Two, Three Already written.

Section 2. The triad in reasoning Not touched. It is to be made as follows 1 Three kinds of signs, as best shown in my last paper in the *Am Jour Math* † 2 Term, proposition, and argument, mentioned in my paper on a new list of categories ‡ 3 Three kinds of argument, deduction, induction, hypothesis, as shown in my paper in *Studies in Logic* § Also three figures of syllogism, as shown there and in my paper on the Classification of Arguments ¶ 4 Three kinds of terms, absolute, relative, and conjugative, as shown in my first paper on Logic of Relatives || There are various other triads which may be alluded to The dual divisions of logic result from a false way of looking at things absolutely. Thus, besides affirmative and negative, there are really probable enunciations, which are intermediate So besides universal and particular there are all sorts of propositions of numerical quantity For example, the particular proposition Some A is B, means "At least one A is B" But we can also say At least 2 A's are B's Also, All the A's but one are B's, etc, etc, *ad infinitum* We pass from dual quantity, or a system of quantity such as that of Boolean algebra, where there are only two values, to plural quantity.

* c. 1890 One of the drafts of this work is headed "Notes for a Book, to be entitled 'A Guess at the Riddle,' with a Vignette of the Sphynx below the Title" This caption is followed by the remark, "And this book, if ever written, as it soon will be if I am in a situation to do it, will be one of the births of time"

† 3 359ff

‡ Ch 6 below

§ Vol 2, bk III, ch 8

¶ Vol 2, bk III, ch 2.

| Vol 3, No III

Section 3 The triad in metaphysics. This chapter, one of the best, is to treat of the theory of cognition.

Section 4. The triad in psychology. The greater part is written.

Section 5. The triad in physiology. The greater part is written.

Section 6 The triad in biology. This is to show the true nature of the Darwinian hypothesis.

Section 7 The triad in physics. The germinal section 1 The necessity of a natural history of the laws of nature, so that we may get some notion of what to expect. 2 The logical postulate for explanation forbids the assumption of any absolute. That is, it calls for the introduction of Thirdness. 3. Metaphysics is an imitation of geometry, and mathematicians having declared against axioms, the metaphysical axioms are destined to fall too. 4 Absolute chance. 5 The universality of the principle of habit. 6 The whole theory stated. 7 Consequences.

Section 8 The triad in sociology or, shall I say, pneumatology. That the consciousness is a sort of public spirit among the nerve-cells. Man as a community of cells; compound animals and composite plants; society, nature. Feeling implied in Firstness.

Section 9. The triad in theology. Faith requires us to be materialists without flinching.*

§1. TRICHOTOMY†^p

355. Perhaps I might begin by noticing how different numbers have found their champions. Two was extolled by Peter Ramus, Four by Pythagoras, Five by Sir Thomas Browne, and so on. For my part, I am a determined foe of no innocent number, I respect and esteem them all in their several ways; but I am forced to confess to a leaning to the number Three in philosophy. In fact, I make so much use of threefold divisions in my speculations, that it seems best to commence by making a slight preliminary study of the conceptions upon which all such divisions must rest. I mean no more than the ideas of

* The last two sections do not seem to have been written.

† The sections of this book were originally called "chapters." There are a number of alternative versions of this section. 1 and 2 of the preface, are from one such alternative.

first, second, third — ideas so broad that they may be looked upon rather as moods or tones of thought, than as definite notions, but which have great significance for all that. Viewed as numerals, to be applied to what objects we like, they are indeed thin skeletons of thought, if not mere words. If we only wanted to make enumerations, it would be out of place to ask for the significations of the numbers we should have to use, but then the distinctions of philosophy are supposed to attempt something far more than that, they are intended to go down to the very essence of things, and if we are to make one single threefold philosophical distinction, it behooves us to ask beforehand what are the kinds of objects that are first, second, and third, not as being so counted, but in their own true characters. That there are such ideas of the really first, second, and third, we shall presently find reason to admit.

356 ' The first is that whose being is simply in itself, not referring to anything nor lying behind anything. The second is that which is what it is by force of something to which it is second. The third is that which is what it is owing to things between which it mediates and which it brings into relation to each other.

' 357 The idea of the absolutely first must be entirely separated from all conception of or reference to anything else, for what involves a second is itself a second to that second. The first must therefore be present and immediate, so as not to be second to a representation. It must be fresh and new, for if old it is second to its former state. It must be initiative, original, spontaneous, and free, otherwise it is second to a determining cause. It is also something vivid and conscious, so only it avoids being the object of some sensation. It precedes all synthesis and all differentiation, it has no unity and no parts. It cannot be articulately thought: assert it, and it has already lost its characteristic innocence, 'for assertion always implies a denial of something else.' 'Stop to think of it, and it has flown!' What the world was to Adam on the day he opened his eyes to it, before he had drawn any distinctions or had become conscious of his own existence — that is first, present, immediate, fresh, new, initiative, original, spontaneous, free, vivid, conscious, and evanescent. Only, remember that every description of it must be false to it.

358 Just as the first is not absolutely first if thought along with a second, so likewise to think the second in its perfection we must banish every third. The second is therefore the absolute last. But we need not, and must not, banish the idea of the first from the second: on the contrary, the second is precisely that which cannot be without the first. It meets us in such facts as another, relation, compulsion, effect, dependence, independence, negation, occurrence, reality, result. A thing cannot be other, negative, or independent, without a first to or of which it shall be other, negative, or independent. Still, this is not a very deep kind of secondness; for the first might in these cases be destroyed yet leave the real character of the second absolutely unchanged. When the second suffers some change from the action of the first, and is dependent upon it, the secondness is more genuine. But the dependence must not go so far that the second is a mere accident or incident of the first: otherwise the secondness again degenerates. The genuine second suffers and yet resists, like dead matter, whose existence consists in its inertia. Note, too, that for the second to have the finality that we have seen belongs to it, it must be determined by the first immovably, and thenceforth be fixed; so that unalterable fixity becomes one of its attributes. We find secondness in occurrence, because an occurrence is something whose existence consists in our knocking up against it. A hard fact is of the same sort; that is to say, it is something which is there, and which I cannot think away, but am forced to acknowledge as an object or second beside myself, the subject or number one, and which forms material for the exercise of my will.

The idea of second must be reckoned as an easy one to comprehend. That of first is so tender that you cannot touch it without spoiling it; but that of second is eminently hard and tangible. It is very familiar, too; it is forced upon us daily; it is the main lesson of life. In youth, the world is fresh and we seem free; but limitation, conflict, constraint, and secondness generally, make up the teaching of experience. With what firstness

“The scarfed bark puts from her native bay;”
with what secondness

“doth she return,
With overweathered ribs and ragged sails.”

But familiar as the notion is, and compelled as we are to acknowledge it at every turn, still we never can realize it; we never can be immediately conscious of finiteness, or of anything but a divine freedom that in its own original firstness knows no bounds

359. First and second, agent and patient, yes and no, are categories which enable us roughly to describe the facts of experience, and they satisfy the mind for a very long time. But at last they are found inadequate, and the third is the conception which is then called for. The third is that which bridges over the chasm between the absolute first and last, and brings them into relationship. We are told that every science has its qualitative and its quantitative stage, now its qualitative stage is when dual distinctions — whether a given subject has a given predicate or not — suffice, the quantitative stage comes when, no longer content with such rough distinctions, we require to insert a possible halfway between every two possible conditions of the subject in regard to its possession of the quality indicated by the predicate. Ancient mechanics recognized forces as causes which produced motions as their immediate effects, looking no further than the essentially dual relation of cause and effect. That was why it could make no progress with dynamics. The work of Galileo and his successors lay in showing that forces are accelerations by which [a] state of velocity is gradually brought about. The words "cause" and "effect" still linger, but the old conceptions have been dropped from mechanical philosophy, for the fact now known is that in certain relative positions bodies undergo certain accelerations. Now an acceleration, instead of being like a velocity a relation between two successive positions, is a relation between three, so that the new doctrine has consisted in the suitable introduction of the conception of threeness. On this idea, the whole of modern physics is built. The superiority of modern geometry, too, has certainly been due to nothing so much as to the bridging over of the innumerable distinct cases with which the ancient science was encumbered, and we may go so far as to say that all the great steps in the method of science in every department have consisted in bringing into relation cases previously discrete.

360. We can easily recognize the man whose thought is

mainly in the dual stage by his unmeasured use of language. In former days, when he was natural, everything with him was unmitigated, absolute, ineffable, utter, matchless, supreme, unqualified, root and branch; but now that it is the fashion to be depreciatory, he is just as plainly marked by the ridiculous inadequacy of his expressions. The principle of contradiction is a shibboleth for such minds; to disprove a proposition they will always try to prove there lurks a contradiction in it, notwithstanding that it may be as clear and comprehensible as the day. Remark for your amusement the grand unconcern with which mathematics, since the invention of the calculus, has pursued its way, caring no more for the peppering of contradiction-mongers than an ironclad for an American fort.

361 We have seen that it is the immediate consciousness that is preeminently first, the external dead thing that is preeminently second. In like manner, it is evidently the representation mediating between these two that is preeminently third. Other examples, however, should not be neglected. The first is agent, the second patient, the third is the action by which the former influences the latter. Between the beginning as first, and the end as last, comes the process which leads from first to last.

362. According to the mathematicians, when we measure along a line, were our yardstick replaced by a yard marked off on an infinitely long rigid bar, then in all the shiftings of it which we make for the purpose of applying it to successive portions of the line to be measured, two points on that bar would remain fixed and unmoved. To that pair of points, the mathematicians accord the title of the absolute, they are the points that are at an infinite distance one way and the other as measured by that yard. These points are either really distinct, coincident, or imaginary (in which case there is but a finite distance completely round the line), according to the relation of the mode of measurement to the nature of the line upon which the measurement is made. These two points are the absolute first and the absolute last or second, while every measurable point on the line is of the nature of a third. We have seen that the conception of the absolute first eludes every attempt to grasp it, and so in another sense does that of the absolute second, but there is no absolute third, for the third is of its own nature relative, and this is what we are always think-

ing, even when we aim at the first or second The starting-point of the universe, God the Creator, is the Absolute First, the terminus of the universe, God completely revealed, is the Absolute Second, every state of the universe at a measurable point of time is the third If you think the measurable is all there is, and deny it any definite tendency whence or whither, then you are considering the pair of points that makes the absolute to be imaginary and are an Epicurean. If you hold that there is a definite drift to the course of nature as a whole, but yet believe its absolute end is nothing but the Nirvana from which it set out, you make the two points of the absolute to be coincident, and are a pessimist But if your creed is that the whole universe is approaching in the infinitely distant future a state having a general character different from that toward which we look back in the infinitely distant past, you make the absolute to consist in two distinct real points and are an evolutionist ¹ This is one of the matters concerning which a man can only learn from his own reflections, but I believe that if my suggestions are followed out, the reader will grant that one, two, three, are more than mere count-words like "eeny, meeny, miny, mo," but carry vast, though vague ideas -

363. But it will be asked, why stop at three? Why not go on to find a new conception in four, five, and so on indefinitely? The reason is that while it is impossible to form a genuine three by any modification of the pair, without introducing something of a different nature from the unit and the pair, four, five, and every higher number can be formed by mere complications of threes. To make this clear, I will first show it in an example The fact that A presents B with a gift C, is a triple relation, and as such cannot possibly be resolved into any combination of dual relations Indeed, the very idea of a combination involves that of thirdness, for a combination is something which is what it is owing to the parts which it brings into mutual relationship But we may waive that consideration, and still we cannot build up the fact that A presents C to B by

¹ The last view is essentially that of Christian theology, too The theologians hold the physical universe to be finite, but considering that universe which they will admit to have existed from all time, it would appear to be in a different condition in the end from what it was in the beginning, the whole spiritual creation having been accomplished, and abiding

any aggregate of dual relations between A and B, B and C, and C and A. A may enrich B, B may receive C, and A may part with C, and yet A need not necessarily give C to B. For that, it would be necessary that these three dual relations should not only coexist, but be welded into one fact. 'Thus we see that a triad cannot be analyzed into dyads.' But now I will show by an example that a four can be analyzed into threes. Take the quadruple fact that A sells C to B for the price D. This is a compound of two facts: first, that A makes with C a certain transaction, which we may name E; and second, that this transaction E is a sale of B for the price D. Each of these two facts is a triple fact, and their combination makes up [as] genuine [a] quadruple fact as can be found. The explanation of this striking difference is not far to seek. A dual relative term, such as "lover" or "servant," is a sort of blank form, where there are two places left blank. I mean that in building a sentence round "lover," as the principal word of the predicate, we are at liberty to make anything we see fit the subject, and then, besides that, anything we please the object of the action of loving. But a triple relative term such as "giver" has two correlates, and is thus a blank form with three places left blank. Consequently, we can take two of these triple relatives and fill up one blank place in each with the same letter, X, which has only the force of a pronoun or identifying index, and then the two taken together will form a whole having four blank places; and from that we can go on in a similar way to any higher number. But when we attempt to imitate this proceeding with dual relatives, and combine two of them by means of an X, we find we only have two blank places in the combination, just as we had in either of the relatives taken by itself. A road with only three-way forkings may have any number of termini, but no number of straight roads put end on end will give more than two termini. Thus any number, however large, can be built out of triads: and consequently no idea can be involved in such a number, radically different from the idea of three. I do not mean to deny that the higher numbers may present interesting special configurations from which notions may be derived of more or less general applicability, but these cannot rise to the height of philosophical categories so fundamental as those that have been considered.

364. The argument of this book has been developed in the mind of the author, substantially as it is presented, as a following out of these three conceptions, in a sort of game of "follow-my-leader" from one field of thought into another. Their importance was originally brought home to me in the study of logic, where they play so remarkable a part that I was led to look for them in psychology. Finding them there again, I could not help asking myself whether they did not enter into the physiology of the nervous system. By drawing a little on hypothesis, I succeeded in detecting them there, and then the question naturally came how they would appear in the theory of protoplasm in general. Here I seemed to break into an interesting avenue of reflections giving instructive *aperçus* both into the nature of protoplasm and into the conceptions themselves, though it was not till later that I mapped out my thoughts on the subject as they are presented in Section 4. I had no difficulty in following the lead into the domain of natural selection, and once arrived at that point, I was irresistibly carried on to speculations concerning physics. One bold saltus landed me in a garden of fruitful and beautiful suggestions, the exploration of which long prevented my looking further. As soon, however, as I was induced to look further, and to examine the application of the three ideas to the deepest problems of the soul, nature, and God, I saw at once that they must carry me far into the heart of those primeval mysteries. That is the way the book has grown in my mind: it is also the order in which I have written it, and only this first chapter is more or less an afterthought, since at an earlier stage of my studies I should have looked upon the matter here set down as too vague to have any value. I should have discerned in it too strong a resemblance to many a crack-brained book that I had laughed over. A deeper study has taught me that even out of the mouths of babes and sucklings strength may be brought forth, and that weak metaphysical trash has sometimes contained the germs of conceptions capable of growing up into important and positive doctrines.

365. Thus, the whole book being nothing but a continual exemplification of the triad of ideas, we need linger no longer upon this preliminary exposition of them. There is, however, one feature of them upon which it is quite indispensable to

dwell. It is that there are two distinct grades of Secondness ✓ and three grades of Thirdness. There is a close analogy to this in geometry. Conic sections are either the curves usually so called, or they are pairs of straight lines. A pair of straight lines is called a degenerate conic. So plane cubic curves are either the genuine curves of the third order, or they are conics paired with straight lines, or they consist of three straight lines, so that there are the two orders of degenerate cubics. Nearly in this same way, besides genuine Secondness, there is a degenerate sort which does not exist as such, but is only so conceived. The medieval logicians (following a hint of Aristotle) distinguished between real relations and relations of reason. A real relation subsists in virtue of a fact which would be totally impossible were either of the related objects destroyed, while a relation of reason subsists in virtue of two facts, one only of which would disappear on the annihilation of either of the relates. Such are all resemblances. for any two objects in nature resemble each other, and indeed in themselves just as much as any other two, it is only with reference to our senses and needs that one resemblance counts for more than another. Rumford and Franklin resembled each other by virtue of being both Americans, but either would have been just as much an American if the other had never lived. On the other hand, the fact that Cain killed Abel cannot be stated as a mere aggregate of two facts, one concerning Cain and the other concerning Abel. Resemblances are not the only relations of reason, though they have that character in an eminent degree. Contrasts and comparisons are of the same sort. Resemblance is an identity of characters; and this is the same as to say that the mind gathers the resembling ideas together into one conception. Other relations of reason arise from ideas being connected by the mind in other ways, they consist in the relation between two parts of one complex concept, or, as we may say, in the relation of a complex concept to itself, in respect to two of its parts. This brings us to consider a sort of degenerate Secondness that does not fulfill the definition of a relation of reason. Identity is the relation that everything bears to itself. Lucullus dines with Lucullus. Again, we speak of allurements and motives in the language of forces, as though a man suffered compulsion from within. So with the voice of conscience and

we observe our own feelings by a reflective sense An echo is my own voice coming back to answer itself So also, we speak of the abstract quality of a thing as if it were some second thing that the first thing possesses But the relations of reason and these self-relations are alike in this, that they arise from the mind setting one part of a notion into relation to another All degenerate seconds may be conveniently termed internal, in contrast to external seconds, which are constituted by external fact, and are true actions of one thing upon another

✓ 366 Among thirds, there are two degrees of degeneracy The first is where there is in the fact itself no Thirdness or mediation, but where there is true duality, the second degree is where there is not even true Secondness in the fact itself Consider, first, the thirds degenerate in the first degree A pin fastens two things together by sticking through one and also through the other either might be annihilated, and the pin would continue to stick through the one which remained A mixture brings its ingredients together by containing each We may term these accidental thirds "How did I slay thy son?" asked the merchant, and the jinnee replied, "When thou threwest away the date-stone, it smote my son, who was passing at the time, on the breast, and he died forthright " Here there were two independent facts, first that the merchant threw away the date-stone, and second that the date-stone struck and killed the jinnee's son Had it been aimed at him, the case would have been different, for then there would have been a relation of aiming which would have connected together the aimer, the thing aimed, and the object aimed at, in one fact What monstrous injustice and inhumanity on the part of that jinnee to hold that poor merchant responsible for such an accident! I remember how I wept at it, as I lay in my father's arms and he first told me the story It is certainly just that a man, even though he had no evil intention, should be held responsible for the immediate effects of his actions, but not for such as might result from them in a sporadic case here and there, but only for such as might have been guarded against by a reasonable rule of prudence Nature herself often supplies the place of the intention of a rational agent in making a Thirdness genuine and not merely accidental as when a spark, as third, falling into a barrel of gunpowder, first, causes an

explosion, as second. But how does nature do this? By virtue of an intelligible law according to which she acts. If two forces are combined according to the parallelogram of forces, their resultant is a real third. Yet any force may, by the parallelogram of forces, be mathematically resolved into the sum of two others, in an infinity of different ways. Such components, however, are mere creations of the mind. What is the difference? As far as one isolated event goes, there is none; the real forces are no more present in the resultant than any components that the mathematician may imagine. But what makes the real forces really there is the general law of nature which calls for them, and not for any other components of the resultant. Thus, intelligibility, or reason objectified, is what makes Thirdness genuine.

367. We now come to thirds degenerate in the second degree. The dramatist Marlowe had something of that character of diction in which Shakespeare and Bacon agree. This is a trivial example, but the mode of relation is important. In natural history, intermediate types serve to bring out the resemblance between forms whose similarity might otherwise escape attention, or not be duly appreciated. In portraiture, photographs mediate between the original and the likeness. In science, a diagram or analogue of the observed fact leads on to a further analogy. The relations of reason which go to the formation of such a triple relation need not be all resemblances. Washington was eminently free from the faults in which most great soldiers resemble one another. A centaur is a mixture of a man and a horse. Philadelphia lies between New York and Washington. Such thirds may be called intermediate thirds or thirds of comparison.

368. Nobody will suppose that I wish to claim any originality in reckoning the triad important in philosophy. Since Hegel, almost every fanciful thinker has done the same. Originality is the last of recommendations for fundamental conceptions. On the contrary, the fact that the minds of men have ever been inclined to threefold divisions is one of the considerations in favor of them. Other numbers have been objects of predilection to this philosopher and that, but three has been prominent at all times and with all schools. My whole method will be found to be in profound contrast with that of

Hegel, I reject his philosophy *in toto*. Nevertheless, I have a certain sympathy with it, and fancy that if its author had only noticed a very few circumstances he would himself have been led to revolutionize his system. One of these is the double division or dichotomy of the second idea of the triad. He has usually overlooked external Secondness, altogether. In other words, he has committed the trifling oversight of forgetting that there is a real world with real actions and reactions. Rather a serious oversight that. Then Hegel had the misfortune to be unusually deficient in mathematics. He shows this in the very elementary character of his reasoning. Worse still, while the whole burden of his song is that philosophers have neglected to take Thirdness into account, which is true enough of the theological kind, with whom alone he was acquainted (for I do not call it acquaintance to look into a book without comprehending it), he unfortunately did not know, what it would have been of the utmost consequence for him to know, that the mathematical analysts had in great measure escaped this great fault, and that the thorough-going pursuit of the ideas and methods of the differential calculus would be sure to cure it altogether. Hegel's dialectical method is only a feeble and rudimentary application of the principles of the calculus to metaphysics. Finally Hegel's plan of evolving everything out of the abstractest conception by a dialectical procedure, though far from being so absurd as the experientialists think, but on the contrary representing one of the indispensable parts of the course of science, overlooks the weakness of individual man, who wants the strength to wield such a weapon as that.

§2. THE TRIAD IN REASONING*

369 Kant, the King of modern thought, it was who first remarked the frequency in logical analytics of *trichotomies* or threefold distinctions. It really is so, I have tried hard and long to persuade myself that it is only fanciful, but the facts will not countenance that way of disposing of the phenomenon. Take any ordinary syllogism

* From "One, Two, Three Fundamental Categories of Thought and of Nature," c. 1885. This paper does not seem to form part of "A Guess at the Riddle," but is here inserted to take the place of the unwritten section 2 of the original work.

All men are mortal,
 Elijah was a man;
 Therefore, Elijah was mortal.

There are here three propositions, namely, two premises and a conclusion, there are also three terms, *man*, *mortal*, and *Elijah*. If we transpose one of the premises with the conclusion, denying both, we obtain what are called the indirect figures of syllogism, for example

All men are mortal,
 But Elijah was not mortal,
 Therefore, Elijah was not a man
 Elijah was not mortal,
 But Elijah was a man;
 Therefore, some men are not mortal

Thus, there are three figures of ordinary syllogism. It is true there are other modes of inference which do not come under any of these heads, but that does not annul the fact that we have here a trichotomy. Indeed, if we examine by itself what is by some logicians called the fourth figure, we find that it also has three varieties related to one another as the three figures of ordinary syllogism. There is an entirely different way of conceiving the relations of the figures of syllogism; namely, by means of the conversion of propositions. But from that point of view also, the same classes are preserved. DeMorgan* has added a large number of new syllogistic moods which do not find places in this classification. The reasoning in these is of a peculiar character and introduces the principle of dilemma. Still, regarding these dilemmatic reasonings by themselves, they fall into three classes in a precisely similar manner. Again, I have shown† that the probable and approximate inferences of science must be classified on the very same principles, being either Deductions, Inductions, or Hypotheses. Other examples of threes in logic are statements of what is actual, what is possible, and what is necessary; the three kinds of forms, Names,‡ Propositions, and Inferences,§ affirmative, negative, and uncertain answers to a question. One very important triad is this: it has been found that there are three

* *Formal Logic*, ch. 8. See also 2568

† Or Terms, but see 372.

‡ See vol. 2, bk. III, chs. 2 and 5

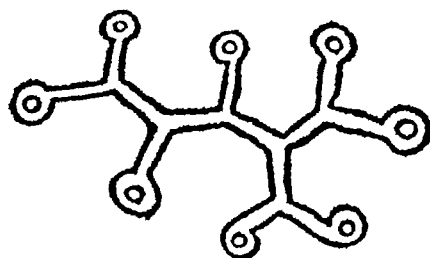
§ Or Arguments.

• kinds of signs which are all indispensable in all reasoning, the first is the diagrammatic sign or *icon*, which exhibits a similarity or analogy to the subject of discourse, the second is the *index*, which like a pronoun demonstrative or relative, forces the attention to the particular object intended without describing it; the third [or symbol] is the general name or description which signifies its object by means of an association of ideas or habitual connection between the name and the character signified.

370. But there is one triad in particular which throws a strong light on the nature of all the others. Namely, we find it necessary to recognize in logic three kinds of characters, three kinds of facts. First there are *singular* characters which are predicable of single objects, as when we say that anything is white, large, etc. Secondly, there are dual characters which appertain to pairs of objects, these are implied by all relative terms as "lower," "similar," "other," etc. Thirdly, there are plural characters, which can all be reduced to triple characters but not to dual characters. Thus, we cannot express the fact that A is a benefactor of B by any descriptions of A and B separately, we must introduce a relative term. This is requisite, not merely in English, but in every language which might be invented. This is true even of such a fact as A is taller than B. If we say, "A is tall, but B is short," the conjugation "but" has a relative force, and if we omit this word the mere collocation of the two sentences is a relative or dual mode of signifying . . .

371. Let us now consider a triple character, say that A gives B to C. This is not a mere congeries of dual characters. It is not enough to say that A parts with C, and that B receives C. A synthesis of these two facts must be made to bring them into a single fact, we must express that C, in being parted with by A, is received by B. If, on the other hand, we take a quadruple fact, it is easy to express as a compound of two triple facts. . . We are here able to express the synthesis of the two facts into one, because a triple character involves the conception of synthesis. Analysis involves the same relations as synthesis, so that we may explain the fact that all plural facts can be reduced to triple facts in this way. A road with a fork in it is the analogue of a triple fact, because it brings three termini into relation with one another. A dual fact is like a

road without a fork; it only connects two termini. Now, no combination of roads without forks can have more than two termini; but any number of termini can be connected by roads which nowhere have a knot of more than three ways. See the



figure, where I have drawn the termini as self-returning roads, in order to introduce nothing beyond the road itself. Thus, the three essential elements of a network of roads are *road about a terminus*, *roadway-connection*, and *branching*; and in like manner, the three fundamental categories of fact are, fact about an object, fact about two objects (relation), fact about several objects (synthetic fact)

372 We have seen that the mere coexistence of two singular facts constitutes a degenerate form of dual fact, and in like manner there are two orders of degeneracy in plural facts, for either they may consist in a mere synthesis of facts of which the highest is dual, or they may consist in a mere synthesis of singular facts. This explains why there should be three classes of *signs*, for there is a triple connection of *sign*, *thing signified*, *cognition produced in the mind*. There may be a mere relation of reason between the sign and the thing signified, in that case the sign is an *icon*. Or there may be a direct physical connection, in that case, the sign is an *index*. Or there may be a relation which consists in the fact that the mind associates the sign with its object, in that case the sign is a *name** [or *symbol*]. Now consider the difference between a logical *term*, a *proposition*, and an *inference*. A term is a mere general description, and as neither *icon* nor *index* possesses generality, it must be a name, and it is nothing more. A proposition is also a general description, but it differs from a term in that it purports to be in a real relation to the fact, to be really determined by it, thus, a proposition can only be formed of the conjunction of a name and an index. An inference, too, contains a general description. . .

* Cf. 369

§3. THE TRIAD IN METAPHYSICS^P

373 I will run over all the conceptions that played an important part in the pre-Socratic philosophy and see how far they can be expressed in terms of one, two, three

1. The first of all the conceptions of philosophy is that of a primal matter out of which the world is made Thales and the early Ionian philosophers busied themselves mainly with this They called it the ἀρχή, the beginning, so that the conception of first was the quintessence of it Nature was a wonder to them, and they asked its explanation, from what did it come? That was a good question, but it was rather stupid to suppose that they were going to learn much even if they could find out from what sort of matter it was made. But to ask how it had been formed, as they doubtless did, was not an exhaustive question, it would only carry them back a little way. They wished to go to the very beginning at once, and in the beginning there must have been a homogeneous something, for where there was variety they supposed there must be always an explanation to be sought The first must be indeterminate, and the indeterminate first of anything is the material of which it is formed. Besides, their idea was that they could not tell how the world was formed unless they knew from what to begin their account The inductive [method] of explaining phenomena by tracing them back step by step to their causes was foreign not only to them but to all ancient and medieval philosophy, that is the Baconian idea. Indeterminacy is really a character of the first But not the indeterminacy of homogeneity The first is full of life and variety. Yet that variety is only potential, it is not definitely there Still, the notion of explaining the variety of the world, which was what they mainly wondered at, by non-variety was quite absurd How is variety to come out of the womb of homogeneity, only by a principle of spontaneity, which is just that virtual variety that is the first.*

§4. THE TRIAD IN PSYCHOLOGY†^P

374. The line of reasoning which I propose to pursue is peculiar and will need some careful study to estimate the

* No more of this section seems to have been written, but see vol 6

† Cf vol 8

strength of it. I shall review it critically in the last section, but meantime I desire to point out that the step I am about to take, which is analogous to others that will follow, is not so purely of the nature of a guess as might be supposed by persons expert in judging of scientific evidence. We have seen that the ideas of one, two, three, are forced upon us in logic, and really cannot be dispensed with. They meet us not once but at every turn. And we have found reason to think that they are equally important in metaphysics. How is the extraordinary prominence of these conceptions to be explained? Must it not be that they have their origin in the nature of the mind? This is the Kantian form of inference, which has been found so cogent in the hands of that hero of philosophy; and I do not know that modern studies have done anything to discredit it. It is true we no longer regard such a psychological explanation of a conception to be as final as Kant thought. It leaves further questions to be asked, but as far as it goes it seems to be satisfactory. We find the ideas of first, second, third, constant ingredients of our knowledge. It must then either be that they are continually given to us in the presentations of sense, or that it is the peculiar nature of the mind to mix them with our thoughts. Now we certainly cannot think that these ideas are given in sense. First, second, and third are not sensations. They can only be given in sense by things appearing labelled as first, second, and third, and such labels things do not usually bear. They ought therefore to have a psychological origin. A man must be a very uncompromising partisan of the theory of the *tabula rasa* to deny that the ideas of first, second, and third are due to congenital tendencies of the mind. So far there is nothing in my argument to distinguish it from that of many a Kantian. The noticeable thing is that I do not rest here, but seek to put the conclusion to the test by an independent examination of the facts of psychology, to see whether we can find any traces of the existence of three parts or faculties of the soul or modes of consciousness, which might confirm the result just reached.

375. Now, three departments of the mind have been generally recognized since Kant, they are Feeling [of pleasure and pain], Knowing, and Willing. The unanimity with which this trisection of the mind has been accepted is, indeed, quite sur-

only by secondary signs and not by our original faculty of recognizing fact

377. It seems, then, that the true categories of consciousness are: first, feeling, the consciousness which can be included with an instant of time, passive consciousness of quality, without recognition or analysis, second, consciousness of an interruption into the field of consciousness, sense of resistance, of an external fact, of another something, third, synthetic consciousness, binding time together, sense of learning thought.

378. If we accept these [as] the fundamental elementary modes of consciousness, they afford a psychological explanation of the three logical conceptions of quality, relation, and synthesis or mediation. The conception of quality, which is absolutely simple in itself and yet viewed in its relations is seen to be full of variety, would arise whenever feeling or the singular consciousness becomes prominent. The conception of relation comes from the dual consciousness or sense of action and reaction. The conception of mediation springs out of the plural consciousness or sense of learning.

379. We remember it [sensation], that is to say, we have another cognition which professes to reproduce it; but we know that there is no resemblance between the memory and the sensation, because, in the first place, nothing can resemble an immediate feeling, for resemblance supposes a dismemberment and recomposition which is totally foreign to the immediate, and in the second place, memory is an articulated complex and worked-over product which differs infinitely and immeasurably from feeling. Look at a red surface, and try to feel what the sensation is, and then shut your eyes and remember it. No doubt different persons are different in this respect, to some the experiment will seem to yield an opposite result, but I have convinced myself that there is nothing in my memory that is in the least like the vision of the red. When red is not before my eyes, I do not see it at all. Some people tell me they see it faintly — a most inconvenient kind of memory, which would lead to remembering bright red as pale or dingy. I remember colors with unusual accuracy, because I have had much training in observing them; but my memory does not consist in any vision but in a habit by virtue of which I can recognize a newly presented color as like or unlike one I had

seen before But even if the memory of some persons is of the nature of an hallucination, enough arguments remain to show that immediate consciousness or feeling is absolutely unlike anything else.

380. There are grave objections to making a whole third of the mind of the will alone One great psychologist has said that the will is nothing but the strongest desire. I cannot grant that, it seems to me to overlook that fact which of all that we observe is quite the most obtrusive, namely, the difference between dreaming and doing This is not a question of defining, but of noticing what we experience, and surely he who can confound desiring with doing must be a day-dreamer. The evidence, however, seems to be pretty strong that the consciousness of willing does not differ, at least not very much, from a sensation. The sense of hitting and of getting hit are nearly the same, and should be classed together The common element is the sense of an actual occurrence, of actual action and reaction. There is an intense reality about this kind of experience, a sharp sundering of subject and object While I am seated calmly in the dark, the lights are suddenly turned on, and at that instant I am conscious, not of a process of change, but yet of something more than can be contained in an instant. I have a sense of a saltus, of there being two sides to that instant. A consciousness of polarity would be a tolerably good phrase to describe what occurs For will, then, as one of the great types of consciousness, we ought to substitute the polar sense.

381. But by far the most confused of the three members of the division, in its ordinary statement, is Cognition. In the first place every kind of consciousness enters into cognition Feelings, in the sense in which alone they can be admitted as a great branch of mental phenomena, form the warp and woof of cognition, and even in the objectionable sense of pleasure and pain, they are constituents of cognition The will, in the form of attention, constantly enters, and the sense of reality or objectivity, which is what we have found ought to take the place of will, in the division of consciousness, is even more essential yet, if possible But that element of cognition which is neither feeling nor the polar sense, is the consciousness of a process, and this in the form of the sense of learning, of acquir-

ing, of mental growth is eminently characteristic of cognition. This is a kind of consciousness which cannot be immediate, because it covers a time, and that not merely because it continues through every instant of that time, but because it cannot be contracted into an instant. It differs from immediate consciousness, as a melody does from one prolonged note. Neither can the consciousness of the two sides of an instant, of a sudden occurrence, in its individual reality, possibly embrace the consciousness of a process. This is the consciousness that binds our life together. It is the consciousness of synthesis

382. Here then, we have indubitably three radically different elements of consciousness, these and no more. And they are evidently connected with the ideas of one-two-three. Immediate feeling is the consciousness of the first, the polar sense is the consciousness of the second, and synthetical consciousness is the consciousness of a third or medium.

383. Note, too, that just as we have seen that there are two orders of Secondness, so the polar sense splits into two, and that in two ways, for first, there is an active and a passive kind, or will and sense, and second, there are external will and sense, in opposition to internal will (self-control, inhibitory will) and internal sense (introspection). In like manner, just as there are three orders of Thirdness, so there are three kinds of synthetical consciousness. The undegenerate and really typical form has not been made so familiar to us as the others, which have been more completely studied by psychologists; I shall therefore mention that last. Synthetical consciousness degenerate in the first degree, corresponding to accidental Thirdness, is where there is an external compulsion upon us to think things together. Association by contiguity is an instance of this, but a still better instance is that in our first apprehension of our experiences, we cannot choose how we will arrange our ideas in reference to time and space, but are compelled to think certain things as nearer together than others. It would be putting the cart before the horse to say that we are compelled to think certain things together because they are together in time and space, the true way of stating it is that there is an exterior compulsion upon us to put them together in our construction of time and space, in our perspective. Synthetical consciousness, degenerate in the second degree, corresponding

to intermediate thirds, is where we think different feelings to be alike or different, which, since feelings in themselves cannot be compared and therefore cannot be alike, so that to say they are alike is merely to say that the synthetical consciousness regards them so, comes to this, that we are internally compelled to synthesize them or to sunder them. This kind of synthesis appears in a secondary form in association by resemblance. But the highest kind of synthesis is what the mind is compelled to make neither by the inward attractions of the feelings or representations themselves, nor by a transcendental force of necessity, but in the interest of intelligibility that is, in the interest of the synthesizing "I think" itself, and this it does by introducing an idea not contained in the data, which gives connections which they would not otherwise have had. This kind of synthesis has not been sufficiently studied, and especially the intimate relationship of its different varieties has not been duly considered. The work of the poet or novelist is not so utterly different from that of the scientific man. The artist introduces a fiction, but it is not an arbitrary one, it exhibits affinities to which the mind accords a certain approval in pronouncing them beautiful, which if it is not exactly the same as saying that the synthesis is true, is something of the same general kind. The geometer draws a diagram, which if not exactly a fiction, is at least a creation, and by means of observation of that diagram he is able to synthesize and show relations between elements which before seemed to have no necessary connection. The realities compel us to put some things into very close relation and others less so, in a highly complicated, and in the [to?] sense itself unintelligible manner, but it is the genius of the mind, that takes up all these hints of sense, adds immensely to them, makes them precise, and shows them in intelligible form in the intuitions of space and time. Intuition is the regarding of the abstract in a concrete form, by the realistic hypostatization of relations, that is the one sole method of valuable thought. Very shallow is the prevalent notion that this is something to be avoided. You might as well say at once that reasoning is to be avoided because it has led to so much error, quite in the same philistine line of thought would that be, and so well in accord with the spirit of nominalism that I wonder some one does not put it forward. The true precept is

not to abstain from hypostatization, but to do it intelligently. . . .^{*}

384. Kant gives the erroneous view that ideas are presented separated and then thought together by the mind. This is his doctrine that a mental synthesis precedes every analysis. What really happens is that something is presented which in itself has no parts, but which nevertheless is analyzed by the mind, that is to say, its having parts consists in this, that the mind afterward recognizes those parts in it. Those partial ideas are really not in the first idea, in itself, though they are separated out from it. It is a case of destructive distillation. When, having thus separated them, we think over them, we are carried in spite of ourselves from one thought to another, and therein lies the first real synthesis. An earlier synthesis than that is a fiction. The whole conception of time belongs to genuine synthesis and is not to be considered under this head.

§5. THE TRIAD IN PHYSIOLOGY^F

385. Granted that there are three fundamentally different kinds of consciousness, it follows as a matter of course that there must be something threefold in the physiology of the nervous system to account for them. No materialism is implied in this, further than that intimate dependence of the action of the mind upon the body, which every student of the subject must and does now acknowledge. Once more a prediction, as it were, is made by the theory, that is to say, certain consequences, not contemplated in the construction thereof, necessarily result from it, and these are of such a character that their truth or falsehood can be independently investigated. Were we to find them strikingly and certainly true, a remarkable confirmation of the theory would be afforded. So much as this, however, I cannot promise, I can only say that they are not certainly false, and we must be content to trace out these consequences, and see what they are, and leave them to the future judgment of physiologists.

386. Two of the three kinds of consciousness, indeed, the simple and dual, receive an instant physiological explanation. We know that the protoplasmic content of every nerve-cell has

^{*} Some manuscript pages seem to be missing here.

its active and passive conditions, and argument is unnecessary to show that feeling, or immediate consciousness, arises in an active state of nerve-cells. Experiments on the effects of cutting the nerves show that there is no feeling after communication with the central nerve-cells is severed, so that the phenomenon has certainly some connection with the nerve-cells; and feeling is excited by just such stimuli as would be likely to throw protoplasm into an active condition. Thus, though we cannot say that every nerve-cell in its active condition has feeling (which we cannot deny, however) there is scarce room to doubt that the activity of nerve-cells is the main physiological requisite for consciousness. On the other hand, the sense of action and reaction, or the polar sense, as we agreed to call it, is plainly connected with the discharge of nervous energy through the nerve-fibres. External volition, the most typical case of it, involves such a discharge into muscle cells. In external sensation, where the polar sense enters in a lower intensity, there is a discharge from the terminal nerve-cell through the afferent nerve upon a cell or cells in the brain. In internal volition, or self-control, there is some inhibitory action of the nerves, which is also known to involve the movement of nervous force; and in internal observation, or visceral sensation, there are doubtless transfers of energy from one central cell to another. Remembering that the polar sense is the sense of the difference between what was before and what is after a dividing instant, or the sense of an instant as having sides, we see clearly that the physiological concomitant of it must be some event which happens very quickly and leaves a more abiding effect, and this description suits the passage of a nervous discharge over a nerve-fibre so perfectly, that I do not think we need hesitate to set this phenomenon down as the condition of dual consciousness.

387 Synthetical consciousness offers a more difficult problem. Yet the explanation of the genuine form of that consciousness, the sense of learning, is easy enough, it is only the degenerate modes, the sense of similarity, and the sense of real connection, which oblige us to hesitate. With regard to these two degenerate forms, I am driven to make hypotheses.

388 When two ideas resemble one another, we say that they have something in common, part of the one is said to be

identical with a part of the other. In what does that identity consist? Having closed both eyes, I open first one and then shut it and open the other, and I say that the two sensations are alike. How can the impressions of two nerves be judged to be alike? It appears to me that in order that that should become possible, the two nerve-cells must probably discharge themselves into one common nerve-cell. In any case, it seems to me that the first supposition to make, for scientific observation to confirm or reject, is that two ideas are alike so far as the same nerve-cells have been concerned in the production of them. In short, the hypothesis is that resemblance consists in the identity of a common element, and that that identity lies in a part of the one idea and a part of the other idea being the feeling peculiar to the excitation of one or more nerve-cells.

389. When we find ourselves under a compulsion to think that two elements of experience which do not particularly resemble one another are, nevertheless, really connected, that connection must, I think, be due in some way to a discharge of nerve-energy, for the whole sense of reality is a determination of polar consciousness, which is itself due to such discharges. For example, I recognize that a certain surface on one side of a certain boundary is red, and on the other side is blue, or that any two qualities are immediately contiguous in space or time. If the contiguity is in time, it is by the polar sense directly that we are conscious of a dividing instant with its difference on the two sides. If the contiguity is in space, I think we have at first a completely confused feeling of the whole, as yet unanalyzed and unsynthesized, but afterward, when the analysis has been made, we find ourselves compelled, in recomposing the elements, to pass directly from what is on one side of the boundary to what is on the other. I suppose then that we are compelled to think the two feelings as contiguous because the nerve-cell whose excitation produces the feeling of one recalled sensation discharges itself into the nerve-cell whose excitation makes the feeling of the other recalled sensation.

390. The genuine synthetic consciousness, or the sense of the process of learning, which is the preeminent ingredient and quintessence of the reason, has its physiological basis quite evidently in the most characteristic property of the nervous

system, the power of taking habits. This depends on five principles, as follows. First, when a stimulus or irritation is continued for some time, the excitation spreads from the cells directly affected to those that are associated with it, and from those to others, and so on, and at the same time increases in intensity. Second, after a time fatigue begins to set in. Now besides the utter fatigue which consists in the cell's losing all excitability, and the nervous system refusing to react to the stimulus at all, there is a gentler fatigue, which plays a very important part in adapting the brain to serving as an organ of reason, this form of fatigue consisting in the reflex action or discharge of the nerve-cell ceasing to go on one path and either beginning on a path where there had been no discharge, or increasing the intensity of the discharge along a path on which there had been previously only a slight discharge. For example, one may sometimes see a frog whose cerebrum or brain has been removed, and whose hind leg has been irritated by putting a drop of acid upon it, after repeatedly rubbing the place with the other foot, as if to wipe off the acid, may at length be observed to give several hops, the first avenue of nervous discharge having become fatigued. Third, when, from any cause the stimulus to a nerve-cell is removed, the excitation quickly subsides. That it does not do so instantly is well known, and the phenomenon goes among physicists by the name of persistence of sensation. All noticeable feeling subsides in a fraction of a second, but a very small remnant continues for a much longer time. Fourth, if the same cell which was once excited, and which by some chance had happened to discharge itself along a certain path or paths, comes to get excited a second time, it is more likely to discharge itself the second time along some or all of those paths along which it had previously discharged itself than it would have been had it not so discharged itself before. This is the central principle of habit, and the striking contrast of its modality to that of any mechanical law is most significant. The laws of physics know nothing of tendencies or probabilities, whatever they require at all they require absolutely and without fail, and they are never disobeyed. Were the tendency to take habits replaced by an absolute requirement that the cell should discharge itself always in the same way, or according to any rigidly

dition whatever, all possibility of habit developing into intelligence would be cut off at the outset; the virtue of Thirdness would be absent. It is essential that there should be an element of chance in some sense as to how the cell shall discharge itself; and then that this chance or uncertainty shall not be entirely obliterated by the principle of habit, but only somewhat affected. Fifth, when a considerable time has elapsed without a nerve having reacted in any particular way, there comes in a principle of forgetfulness or negative habit rendering it the less likely to react in that way. Now let us see what will be the result of these five principles taken in combination. When a nerve is stimulated, if the reflex activity is not at first of the right sort to remove the source of irritation, it will change its character again and again until the cause of irritation is removed, when the activity will quickly subside. When the nerve comes to be stimulated a second time in the same way, probably some of the other movements which had been made on the first occasion will be repeated; but, however this may be, one of them must ultimately be repeated, for the activity will continue until this does happen, I mean that movement which removes the source of irritation. On a third occasion, the process of forgetfulness will have been begun in regard to any tendency to repeat any of the actions of the first occasion which were not repeated on the second. Of those which were repeated, some will probably be repeated again, and some not, but always there remains that one which must be repeated before the activity comes to an end. The ultimate effect of this will inevitably be that a habit gets established of at once reacting in the way which removes the source of irritation, for this habit alone will be strengthened at each repetition of the experiment, while every other will tend to become weakened at an accelerated rate.

391. I have invented a little game or experiment with playing cards to illustrate the working of these principles; and I can promise the reader that if he will try it half a dozen times he will be better able to estimate the value of the account of habit here proposed. The rules of this game are as follows: take a good many cards of four suits, say a pack of fifty-two, though fewer will do. The four suits are supposed to represent four modes in which a cell may react. Let one suit, say

spades, represent that mode of reaction which removes the source of irritation and brings the activity to an end. In order readily to find a card of any suit as wanted, you had better lay all the cards down face up and distribute into four packets, each containing the cards of one suit only. Now take two spades, two diamonds, two clubs, and two hearts, to represent the original disposition of the nerve-cell, which is supposed to be equally likely to react in any of the four ways. You turn these eight cards face down and shuffle them with extreme thoroughness.¹ Then turn up cards from the top of this pack, one by one until a spade is reached. This process represents the reaction of the cell. Take up the cards just dealt off, and add to the pack held in the hand one card of each of those suits that have just been turned up (for habit) and remove from the pack one card of each suit not turned up (for forgetfulness). Shuffle, and go through with this operation thirteen times or until the spades are exhausted. It will then generally be found that you hold nothing but spades in your hand.

392 Thus we see how these principles not only lead to the establishment of habits, but to habits directed to definite ends, namely the removal of sources of irritation. Now it is precisely action according to final causes which distinguishes mental from mechanical action, and the general formula of all our desires may be taken as this: to remove a stimulus. Every man is busily working to bring to an end that state of things which now excites him to work.

393 But we are led yet deeper into physiology. The three fundamental functions of the nervous system, namely, first, the excitation of cells; second, the transfer of excitation over fibres, third, the fixing of definite tendencies under the influence of habit, are plainly due to three properties of the protoplasm or life-slime itself. Protoplasm has its active and its passive condition, its active state is transferred from one part of it to another, and it also exhibits the phenomena of habit.

¹ Cards are almost never shuffled enough to illustrate fairly the principles of probabilities, but if after being shuffled in any of the usual ways, they are dealt into three packs and taken up again, and then passed from one hand into the other one by one, every other one going to the top and every other to the bottom of the pack that thus accumulates in the second hand, and finally cut, the shuffling may be considered as sufficient for the purpose of this game. What is the direction is to shuffle, shuffling as thorough as this is meant.

in the book just quoted the following formula for nuclein, a substance allied to the proteids. It is $C_{29}H_{49}N_9P_3O_{22}$. But as the sum of the numbers of atoms of hydrogen, nitrogen, and phosphorus ought to be even, this formula must be multiplied by some even number, so that the number of atoms in nuclein must be two hundred and twenty-four at the very least. We can hardly imagine, then, that the number of atoms in protoplasm is much less than a thousand, and if one considers the very minute proportions of some necessary ingredients of animal and vegetable organisms, one is somewhat tempted to suspect that fifty thousand might do better, or even come to be looked upon in the future as a ridiculously small guess. Protoplasm combines with water in all proportions, the mode of combination being apparently intermediate between solution and mechanical mixture. According to the amount of water it contains, it passes from being brittle to being pliable, then gelatinous, then slimy, then liquid. Generally, it has the character of being elastico-viscous, that is to say, it springs back partially after a long strain, and wholly after a short one, but its viscosity is much more marked than its elasticity. It is generally full of granules, by which we can see slow streaming motions in it, continuing for some minutes in one way and then generally reversed. The effect of this streaming is to cause protuberances in the mass, often very long and slender. They occasionally stick up against gravity, and their various forms are characteristic of the different kinds of protoplasm. When a mass of it is disturbed by a jar, a poke, an electric shock, heat, etc., the streams are arrested and the whole contracts into a ball; or if it were very much elongated, sometimes breaks up into separate spheres. When the external excitation is removed, the mass sinks down into something like its former condition. Protoplasm also grows, it absorbs material and converts it into the like of its own substance, and in all its growth and reproduction, it preserves its specific characters.

394 Such are the properties that have to be accounted for. What first arrests our attention, as likely to afford the key to the problem, is the contraction of the mass of protoplasm on being disturbed. This is obviously due to a vast and sudden increase of what the physicists call "surface tension," or the pulling together of the outer parts, which phenomenon is always observed in liquids, and is the cause of their making

drops This surface tension is due to the cohesion, or attraction between neighboring molecules. The question is, then, how can a body, on having its equilibrium deranged, suddenly increase the attractions between its neighboring molecules? These attractions must increase rapidly as the distance is diminished; and thus the answer suggests itself that the distance between neighboring molecules is diminished. True, the average distance must remain nearly the same, but if the distances which had previously been nearly equal are rendered unequal, the attractions between the molecules that are brought nearer to one another will be much more increased than those between those that are removed from one another will be diminished. We are thus led to the supposition that in the ordinary state of the substance, its particles are moving for the most part in complicated orbital or quasi-orbital systems, instead of in the chemical molecules or more definite systems of atoms of less complex substances, these particles thus moving in orbits not being, however, atoms, but chemical molecules. But we must suppose that the forces between these particles are just barely sufficient to hold them in their orbits, and that in fact, as long as the protoplasm is in an active condition, they are not all so held, but that one and another get occasionally thrown out of their orbits and wander about until they are drawn in to some other system. We must suppose that these systems have some approximate composition, about so many of one kind of particles and so many of another kind, etc., entering into them. This is necessary to account for the nearly constant chemical composition of the whole. On the other hand, we cannot suppose that the number of the different kinds is rigidly exact, for in that case we should not know how to account for the power of assimilation. We must suppose then that there is considerable range in the numbers of particles that go to form an orbital system, and that the somewhat exact chemical composition of the whole is the exactitude of a statistical average, just as there is a close equality between the proportions of the two sexes in any nation or province, though there is considerable inequality in each of the different households. Owing to the complexity of this arrangement, the moment that there is any molecular disturbance, producing perturbations, large numbers of the particles are thrown out

of their orbits, the systems are more or less deranged in the immediate neighborhood of the disturbance, and the harmonic relations between the different revolutions are somewhat broken up. In consequence of this, the distances between neighboring particles, which had presented a systematic regularity, now become extremely unequal, and their average attractions, upon which the cohesion depends, is increased. At the same time, the particles thrown out of their systems shoot into other systems and derange these in their turn, and so the disturbance is propagated throughout the entire mass. The source of disturbance, however, being removed, interchanges of energy take place, in which there is a tendency to equalize the *vis viva* of the different particles, and they consequently tend to sink down into orbital motions again, and gradually something very like the original state of things is reestablished, the original orbital systems remaining, for the most part, and the wandering particles in large proportion finding places in these systems or forming new ones. Some of these particles will not find any places, and thus there will be a certain amount of wasting of the protoplasmic mass. If the same disturbance is repeated, so far as the orbital systems remain the same as they were before, there will be a repetition of almost exactly the same events. The same kinds of particles (the same I mean in mass, velocities, directions of movement, attractions, etc.) which were thrown out of the different systems before will generally get thrown out again, until, if the disturbance is repeated several times, there gets to be rather a deficiency of those kinds of particles in the different systems, when some new kinds will begin to be thrown out. These new kinds will differently perturb the systems into which they fly, tending to cause classes of particles like themselves to be thrown out, and, in that way, the direction of propagation of the disturbance, as well as its velocity and intensity, may be altered, and, in short, the phenomenon of fatigue will be manifested. Even when the protoplasmic mass is left to itself, there will be some wandering of particles, producing regions of slight disturbance, and so inequalities of tension, and thus, streams will be set up, movements of the mass will take place, and slender processes will be formed. If, however, the mass be left to itself for a very long time, all particles that are

readily thrown out will, in all the changes that are rung on the combinations of situations and velocities in the orbital systems, get thrown out, while the others will constantly tend to settle down into more stable relations; and so the protoplasm will gradually take a passive state from which its orbital systems are not easily deranged. The food for those kinds of protoplasm that are capable of marked reaction has to be presented in chemically complex form. It must doubtless present particles just like those that revolve in the orbital systems of the protoplasm. In order to be drawn into an orbital system, a particle, whether of food matter or just thrown off from some other system, must have the right mass, must present itself at the right point, and move with the right velocity in the right direction and be subject to the right attractions. It will be right in all these respects, if it comes to take the place of a particle which has just been thrown off; and thus, particles taken in are particularly likely to be of the same material and masses and to take the same places in the orbits as those that have been shortly before thrown off. Now these particles being the exact representatives of those thrown off, will be likely to be thrown off by the same disturbances, in the same directions, and with the same results, as those which were thrown off before, and this accounts for the principle of habit. All the higher kinds of protoplasm, those for example which have any marked power of contraction, are fed with matter chemically highly complex.*

§6. THE TRIAD IN BIOLOGICAL DEVELOPMENT

395. Whether the part played by natural selection and the survival of the fittest in the production of species be large or small, there remains little doubt that the Darwinian theory indicates a real cause, which tends to adapt animal and vegetable forms to their environment. A very remarkable feature of it is that it shows how merely fortuitous variations of individuals together with merely fortuitous mishaps to them would, under the action of heredity, result, not in mere irregularity, nor even in a statistical constancy, but in continual and

* The following note is appended to this section "Here the Chemical Idea"
For this, see vol 6, bk. I, ch 8

indefinite progress toward a better adaptation of means to ends. How can this be? What, abstractly stated, is the peculiar factor in the conditions of the problem which brings about this singular consequence?

396. Suppose a million persons, each provided with one dollar, to sit down to play a simple and fair game of chance, betting for example on whether a die turns up an odd or even number. The players are supposed to make their bets independently of one another, and each to bet on the result of each throw one dollar against a dollar on the part of the bank. Of course, at the very first bet, one-half of them would lose their only dollar and go out of the game, for it is supposed that no credit is allowed, while the other half would win each \$1 and so come to be worth \$2. Of these 500,000 players, after the second throw, 250,000 would have lost, and so be worth only \$1 each, while the other 250,000 would have won, and so be worth \$3. After the third throw, 125,000, or one-half of those who had had \$1 each, would be ruined, 250,000 would be worth \$2 (namely one-half the 250,000 who had had \$1 each, and one-half the 250,000 who had had \$3 each) and 125,000 would be worth \$4 each. The further progress of the game is illustrated by the table on page 216, where the numbers of players are given having each possible sum after the first, second, third, etc., throws. It will be seen by the table that, at the end of the fourth throw, the most usual fortune is \$3, at the end of the ninth \$4, at the end of the sixteenth \$5, and in like manner at the end of the twenty-fifth it would be \$6, at the end of the thirty-sixth \$7, and so forth. Here, then, would be a continual increase of wealth, which is a sort of "adaptation to one's environment," produced by a survival of the fittest, that is, by the elimination from the game of every player who has lost his last dollar. It is easy to see that the increase of average and usual wealth comes about by the subtraction of all those small fortunes which would be in the hands of men who had once been bankrupt had they been allowed to continue betting.

397. Now the adaptation of a species to its environment consists, for the purposes of natural selection, in a power of continuing to exist, that is to say, in the power of one generation to bring forth another, for as long as another generation

	<i>First</i>	<i>Second</i>	<i>Third</i>	<i>Fourth</i>	<i>Fifth</i>	<i>Sixth</i>	<i>Seventh</i>	<i>Eighth</i>	<i>Ninth</i>	<i>Tenth</i>	<i>Sixteenth</i>
\$1	..	250,000	..	125,000	..	76,875	..	53,750	..	40,312½	31,744
2	500,000	..	250,000	..	153,750	..	107,500	..	80,625	..	..
3	..	250,000	..	182,500	..	138,125	..	107,500	..	86,406¼	52,292
4	125,000	..	122,500	..	107,500	..	92,187½	..	..
5	62,500	..	76,875	..	76,875	..	77,070¼	55,542
6	31,250	..	46,250	..	61,952⅞*	..	..
7	15,625	..	27,031¼	..	38,710¼	38,880
8	7,812½	..	15,468½	..	..
9	3,906¼	..	8,710¼	19,226
10	1,953⅛	..	..
11	976¼	8,714
12
13
14	1,587
15
16	229
17
	15

* This figure should be 51,952⅞. Because of this error the fifth and seventh figures in the next column are each 5,000 in excess, and, with the exception of the two last items, the entire last column is wrong.

is brought forth the species will continue and as soon as this ceases it is doomed after one lifetime. This reproductive faculty, then, depending partly on direct fecundity, and partly on the animal's living through the age of procreation, is precisely what the Darwinian theory accounts for. This character plainly is one of those which has an absolute minimum, for no animal can produce fewer offspring than none at all and it has no apparent upper limit, so that it is quite analogous to the wealth of those players. It is to be remarked that the phrase "survival of the fittest" in the formula of the principle does not mean the survival of the fittest individuals, but the survival of the fittest types, for the theory does not at all require that individuals ill-adapted to their environment should die at an earlier age than others, so long only as they do not reproduce so many offspring as others, and indeed it is not necessary that this should go so far as to extinguish the line of descent, provided there be some reason why the offspring of ill-adapted parents are less likely than others to inherit those parents' characteristics. It seems likely that the process, as a general rule, is something as follows. A given individual is in some respect ill-adapted to his environment, that is to say, he has characters which are generally unfavorable to the production of numerous offspring. These characters will be apt to weaken the reproductive system of that individual, for various reasons, so that its offspring are not up to the average strength of the species. This second generation will couple with other individuals, but owing to their weakness, their offspring will be more apt to resemble the other parent, and so the unfavorable character will gradually be eliminated, not merely by diminished numbers of offspring, but also by the offspring more resembling the stronger parent. There are other ways in which the unfavorable characters will disappear. When the procreative power is weakened, there are many examples to show that the principle of heredity becomes relaxed, and the race shows more tendency to sporting. This sporting will go on until in the course of it the unfavorable character has become obliterated. The general power of reproduction thereupon becomes strengthened, with it the direct procreative force is reinforced, the hereditary transmission of characters again becomes more strict, and the improved type is hardened.

398. But all these different cases are but so many different modes of one and the same principle, which is the elimination of unfavorable characters. We see then that there are just three factors in the process of natural selection; to wit: first, the principle of individual variation or sporting; second, the principle of hereditary transmission, which wars against the first principle, and third, the principle of the elimination of unfavorable characters.

399 Let us see how far these principles correspond with the triads that we have already met with. The principle of sporting is the principle of irregularity, indeterminacy, chance. It corresponds with the irregular and manifold wandering of particles in the active state of the protoplasm. It is the bringing in of something fresh and first. The principle of heredity is the principle of the determination of something by what went before, the principle of compulsion, corresponding to will and sense. The principle of the elimination of unfavorable characters is the principle of generalization by casting out of sporadic cases, corresponding particularly to the principle of forgetfulness in the action of the nervous system. We have, then, here, a somewhat imperfect reproduction of the same triad as before. Its imperfection may be the imperfection of the theory of development *

§7. THE TRIAD IN PHYSICS

400. Metaphysical philosophy may almost be called the child of geometry. Of the three schools of early Greek philosophers, two, the Ionic and the Pythagorean, were all geometers, and the interest of the Eleatics in geometry is often mentioned. Plato was a great figure in the history of both subjects, and Aristotle derived from the study of space some of his most potent conceptions. Metaphysics depends in great measure on the idea of rigid demonstration from first principles, and this idea, as well in regard to the process as the axioms from which it sets out, bears its paternity on its face. Moreover, the conviction that any metaphysical philosophy is possible has been upheld at all times, as Kant well says, by the example in geometry of a similar science.

* Cf. vol 6, bk I, ch 10

of observation, but why may there not be similar aberrations due to the imperfect obedience of the facts to law?

403. Grant that this is conceivable and there can be nothing in experience to negative it. Strange to say, there are many people who will have a difficulty in conceiving of an element of lawlessness in the universe, and who may perhaps be tempted to reckon the doctrine of the perfect rule of causality as one of the original instinctive beliefs, like that of space having three dimensions. Far from that, it is historically altogether a modern notion, a loose inference from the discoveries of science. Aristotle* often lays it down that some things are determined by causes while others happen by chance. Lucretius,† following Democritus, supposes his primordial atoms to deviate from their rectilinear trajectories just fortuitously, and without any reason at all. To the ancients, there was nothing strange in such notions; they were matters of course, the strange thing would have been to have said that there was no chance. So we are under no inward necessity of believing in perfect causality if we do not find any facts to bear it out.

404. I am very far from holding that experience is our only light; Whewell's views of scientific method seem to me truer than Mill's, so much so that I should pronounce the known principles of physics to be but a development of original instinctive beliefs. Yet I cannot help acknowledging that the whole history of thought shows that our instinctive beliefs, in their original condition, are so mixed up with error that they can never be trusted till they have been corrected by experiment. Now the only thing that the inference from experience can ever teach us is the approximate value of a ratio. It all rests on the principle of sampling; we take a handful of coffee from a bag, and we judge that there is about the same proportion of sound beans in the whole bag that there is in that sample. At this rate, every proposition which we can be entitled to make about the real world must be an approximate one; we never can have the right to hold any truth to be exact. Approximation must be the fabric out of which our philosophy has to be built.

* e.g. in the *Physics* 195b, 31-198a, 13.

† Bk. II, 1 216-93

405. I come now to another point. Most systems of philosophy maintain certain facts or principles as ultimate. In truth, any fact is in one sense ultimate — that is to say, in its isolated aggressive stubbornness and individual reality. What Scotus calls the *hæcceities* of things, the *hereness* and *nowness* of them, are indeed ultimate. Why this which is here is such as it is, how, for instance, if it happens to be a grain of sand, it came to be so small and so hard, we can ask, we can also ask how it got carried here; but the explanation in this case merely carries us back to the fact that it was once in some other place, where similar things might naturally be expected to be. Why IT, independently of its general characters, comes to have any definite place in the world, is not a question to be asked, it is simply an ultimate fact. There is also another class of facts of which it is not reasonable to expect an explanation, namely, facts of indeterminacy or variety. Why one definite kind of event is frequent and another rare, is a question to be asked, but a reason for the general fact that of events some kinds are common and some rare, it would be unfair to demand.

If all births took place on a given day of the week, or if there were always more on Sundays than on Mondays, that would be a fact to be accounted for, but that they happen in about equal proportions on all the days requires no particular explanation. If we were to find that all the grains of sand on a certain beach separated themselves into two or more sharply discrete classes, as spherical and cubical ones, there would be something to be explained, but that they are of various sizes and shapes, of no definable character, can only be referred to the general manifoldness of nature. Indeterminacy, then, or pure firstness, and *hæcceity*, or pure secondness, are facts not calling for and not capable of explanation. Indeterminacy affords us nothing to ask a question about, *hæcceity* is the *ultima ratio*, the brutal fact that will not be questioned. But every fact of a general or orderly nature calls for an explanation, and logic forbids us to assume in regard to any given fact of that sort that it is of its own nature absolutely inexplicable. This is what Kant¹ calls a regulative principle, that is to say, an intellectual hope. The sole immediate purpose of thinking is to render things intelligible, and to think and yet in that very

¹ After the scholastics, See Eclaus [?] in Petrus Hispanus 48b, nota 1.

act to think a thing unintelligible is a self-stultification. It is as though a man furnished with a pistol to defend himself against an enemy were, on finding that enemy very redoubtable, to use his pistol to blow his own brains out to escape being killed by his enemy. Despair is insanity. True, there may be facts that will never get explained, but that any given fact is of the number, is what experience can never give us reason to think, far less can it show that any fact is of its own nature -unintelligible. We must therefore be guided by the rule of hope, and consequently we must reject every philosophy or general conception of the universe, which could ever lead to the conclusion that any given general fact is an ultimate one. We must look forward to the explanation, not of all things, but of any given thing whatever. There is no contradiction here, any more than there is in our holding each one of our opinions, while we are ready to admit that it is probable that not all are true, or any more than there is in saying that any future time will sometime be passed, though there never will be a time when all time is past.

406. Among other regular facts that have to be explained is law or regularity itself. We enormously exaggerate the part -that law plays in the universe. It is by means of regularities that we understand what little we do understand of the world, and thus there is a sort of mental perspective which brings regular phenomena to the foreground. We say that every event is determined by causes according to law. But apart from the fact that this must not be regarded as absolutely true, it does not mean so much as it seems to do. We do not mean, for example, that if a man and his antipode both sneeze at the same instant, that that event comes under any general law. That is merely what we call a coincidence. But what we mean is there was a cause for the first man's sneezing, and another cause for the second man's sneezing; and the aggregate of these two events make up the first event about which we began by inquiring. The doctrine is that the events of the physical universe are merely motions of matter, and that these obey the laws of dynamics. But this only amounts to saying that among the countless systems of relationship existing among things we have found one that is universal and at the same time is subject to law. There is nothing except this singular char-

acter which makes this particular system of relationship any more important than the others. From this point of view, uniformity is seen to be really a highly exceptional phenomenon. But we pay no attention to irregular relationships, as having no interest for us.

407. We are brought, then, to this conformity to law exists only within a limited range of events and even there is not perfect, for an element of pure spontaneity or lawless originality mingles, or at least must be supposed to mingle, with law everywhere. Moreover, conformity with law is a fact requiring to be explained; and since law in general cannot be explained by any law in particular, the explanation must consist in showing how law is developed out of pure chance, irregularity, and indeterminacy.

408. To this problem we are bound to address ourselves, and it is particularly needful to do so in the present state of science. The theory of the molecular constitution of matter has now been carried as far as there are clear indications to direct us, and we are now in the mists. To develop the mathematical consequences of any hypothesis as to the nature and laws of the minute parts of matter, and then to test it by physical experiment, will take fifty years, and out of the innumerable hypotheses that might be framed, there seems to be nothing to make one more antecedently probable than another. At this rate how long will it take to make any decided advance? We need some hint as to how molecules may be expected to behave, whether, for instance, they would be likely to attract or repel one another inversely as the fifth power of the distance, so that we may be saved from many false suppositions, if we are not at once shown the way to the true one. Tell us how the laws of nature came about, and we may distinguish in some measure between laws that might and laws that could not have resulted from such a process of development.

409. To find that out is our task. I will begin the work with this guess. Uniformities in the modes of action of things have come about by their taking habits. At present, the course of events is approximately determined by law. In the past that approximation was less perfect, in the future it will be more perfect. The tendency to obey laws has always been and always will be growing. We look back toward a point in the

infinitely distant past when there was no law but mere indeterminacy; we look forward to a point in the infinitely distant future when there will be no indeterminacy or chance but a complete reign of law. But at any assignable date in the past, however early, there was already some tendency toward uniformity; and at any assignable date in the future there will be some slight aberrancy from law. Moreover, all things have a tendency to take habits. For atoms and their parts, molecules and groups of molecules, and in short every conceivable real object, there is a greater probability of acting as on a former like occasion than otherwise. This tendency itself constitutes a regularity, and is continually on the increase. In looking back into the past we are looking toward periods when it was a less and less decided tendency. But its own essential nature is to grow. It is a generalizing tendency; it causes actions in the future to follow some generalization of past actions, and this tendency is itself something capable of similar generalizations, and thus, it is self-generative. We have therefore only to suppose the smallest spoor of it in the past, and that germ would have been bound to develop into a mighty and over-ruling principle, until it supersedes itself by strengthening habits into absolute laws regulating the action of all things in every respect in the indefinite future.

According to this, three elements are active in the world: first, chance; second, law; and third, habit-taking.

410. Such is our guess of the secret of the sphynx. To raise it from the rank of philosophical speculation to that of a scientific hypothesis, we must show that consequences can be deduced from it with more or less probability which can be compared with observation. We must show that there is some method of deducing the characters of the laws which could result in this way by the action of habit-taking on purely fortuitous occurrences, and a method of ascertaining whether such characters belong to the actual laws of nature.

411. The existence of things consists in their regular behavior. If an atom had no regular attractions and repulsions, if its mass was at one instant nothing, at another a ton, at another a negative quantity, if its motion instead of being continuous, consisted in a series of leaps from one place to another without passing through any intervening places, and

if there were no definite relations between its different positions, velocities and directions of displacement, if it were at one time in one place and at another time in a dozen, such a disjointed plurality of phenomena would not make up any existing thing. Not only substances, but events, too, are constituted by regularities. The flow of time, for example, in itself is a regularity. The original chaos, therefore, where there was no regularity, was in effect a state of mere indeterminacy, in which nothing existed or really happened.

412. Our conceptions of the first stages of the development, before time yet existed, must be as vague and figurative as the expressions of the first chapter of Genesis. Out of the womb of indeterminacy we must say that there would have come something, by the principle of Firstness, which we may call a flash. Then by the principle of habit there would have been a second flash. Though time would not yet have been, this second flash was in some sense after the first, because resulting from it. Then there would have come other successions ever more and more closely connected, the habits and the tendency to take them ever strengthening themselves, until the events would have been bound together into something like a continuous flow. We have no reason to think that even now time is quite perfectly continuous and uniform in its flow. The quasi-flow which would result would, however, differ essentially from time in this respect, that it would not necessarily be in a single stream. Different flashes might start different streams, between which there should be no relations of contemporaneity or succession. So one stream might branch into two, or two might coalesce. But the further result of habit would inevitably be to separate utterly those that were long separated, and to make those which presented frequent common points coalesce into perfect union. Those that were completely separated would be so many different worlds which would know nothing of one another, so that the effect would be just what we actually observe.

413. But Secondness is of two types. Consequently besides flashes genuinely second to others so as to come after them, there will be pairs of flashes, or, since time is now supposed to be developed, we had better say pairs of states, which are reciprocally second, each member of the pair to the other. This

is the first germ of spatial extension. These states will undergo changes; and habits will be formed of passing from certain states to certain others, and of not passing from certain states to certain others. Those states to which a state will immediately pass will be adjacent to it; and thus habits will be formed which will constitute a spatial continuum, but differing from our space by being very irregular in its connections, having one number of dimensions in one place and another number in another place, and being different for one moving state from what it is for another.

414 Pairs of states will also begin to take habits, and thus each state having different habits with reference to the different other states will give rise to bundles of habits, which will be substances.¹ Some of these states will chance to take habits of persistency, and will get to be less and less liable to disappear, while those that fail to take such habits will fall out of existence. Thus, substances will get to be permanent.

415 In fact, habits, from the mode of their formation, necessarily consist in the permanence of some relation, and therefore, on this theory, each law of nature would consist in some permanence, such as the permanence of mass, momentum, and energy. In this respect, the theory suits the facts admirably.

416. The substances carrying their habits with them in their motions through space will tend to render the different parts of space alike. Thus, the dimensionality of space will tend gradually to uniformity; and multiple connections, except at infinity, where substances never go, will be obliterated. At the outset, the connections of space were probably different for one substance and part of a substance from what they were for another, that is to say, points adjacent or near one another for the motions of one body would not be so for another, and this may possibly have contributed to break substances into little pieces or atoms. But the mutual actions of bodies would have tended to reduce their habits to uniformity in this respect; and besides there must have arisen conflicts between the habits of bodies and the habits of parts of space, which would never have ceased till they were brought into conformity.

¹ I use substance, here, in the old sense of a thing, not in the modern chemical sense.

† CHAPTER 4

THE LOGIC OF MATHEMATICS; AN ATTEMPT TO DEVELOP MY CATEGORIES FROM WITHIN^{*P}

§1. THE THREE CATEGORIES

417 Although the present paper deals with mathematics, yet its problems are not mere mathematical problems. It is not proposed to inquire into the methods of reasoning of mathematics particularly, although this subject will incidentally be touched upon. But mathematics performs its reasonings by a *logica utens* which it develops for itself, and has no need of any appeal to a *logica docens*, for no disputes about reasoning arise in mathematics which need to be submitted to the principles of the philosophy of thought for decision. The questions which are here to be examined are, what are the different systems of hypotheses from which mathematical deduction can set out, what are their general characters, why are not other hypotheses possible, and the like. These are not problems which, like those of mathematics, repose upon clear and definite assumptions recognized at the outset, and yet, like mathematical problems, they are questions of possibility and necessity. What the nature of this necessity can be is one of the very matters to be discovered. Thus much, however, is indisputable: if there are really any such necessary characteristics of mathematical hypotheses as I have just declared in advance that we shall find that there [are], this necessity must spring from some truth so broad as to hold not only for the universe we know but for every world that poet could create. And this truth like every truth must come to us by the way of experience. No apriorist ever denied that. The first matters which it is pertinent to examine are the most universal categories of elements of all experience, natural or poetical.

* c. 1896. The first four pages of the manuscript are missing.

418. We remark among phenomena three categories of elements.

The first comprises the qualities of phenomena, such as red, bitter, tedious, hard, heartrending, noble, and there are doubtless manifold varieties utterly unknown to us. Beginners in philosophy may object that these are not qualities of things and are not in the world at all, but are mere sensations. Certainly, we only know such as the senses we are furnished with are adapted to reveal; and it can hardly be doubted that the specializing effect of the evolutionary process which has made us what we are has been to blot the greater part of the senses and sensations which were once dimly felt, and to render bright, clear, and separate the rest. But whether we ought to say that it is the senses that make the sense-qualities or the sense-qualities to which the senses are adapted, need not be determined in haste. It is sufficient that wherever there is a phenomenon there is a quality; so that it might almost seem that there is nothing else in phenomena. The qualities merge into one another. They have no perfect identities, but only likenesses, or partial identities. Some of them, as the colors and the musical sounds, form well-understood systems. Probably, were our experience of them not so fragmentary, there would be no abrupt demarcations between them, at all * Still, each one is what it is in itself without help from the others. They are single but partial determinations.

419. The second category of elements of phenomena comprises the actual facts. The qualities, in so far as they are general, are somewhat vague and potential. But an occurrence is perfectly individual. It happens here and now. A permanent fact is less purely individual; yet so far as it is actual, its permanence and generality only consist in its being there at every individual instant. Qualities are concerned in facts but they do not make up facts. Facts also concern subjects which are material substances. We do not see them as we see qualities, that is, they are not in the very potentiality and essence of sense. But we feel facts resist our will. That is why facts are proverbially called brutal. Now mere qualities do not resist. It is the matter that resists. Even in actual sensation there is a reaction. Now mere qualities, unmaterialized, cannot

* Cf 313, also vol 6, bk. I, ch. 5

actually react. So that, rightly understood, it is correct to say that we immediately, that is, directly perceive matter. To say that we only infer matter from its qualities is to say that we only know the actual through the potential. It would be a little less erroneous to say that we only know the potential through the actual, and only infer qualities by generalization from what we perceive in matter. All that I here insist upon is that quality is one element of phenomena, and fact, action, actuality is another. We shall undertake the analysis of their natures below.

420 The third category of elements of phenomena consists of what we call laws when we contemplate them from the outside only, but which when we see both sides of the shield we call thoughts. Thoughts are neither qualities nor facts. They are not qualities because they can be produced and grow, while a quality is eternal, independent of time and of any realization. Besides, thoughts may have reasons, and indeed, must have some reasons, good or bad. But to ask why a quality is as it is, why red is red and not green, would be lunacy. If red were green it would not be red, that is all. And any semblance of sanity the question may have is due to its being not exactly a question about quality, but about the relation between two qualities, though even this is absurd. A thought then is not a quality. No more is it a fact. For a thought is general. I had it. I imparted it to you. It is general on that side. It is also general in referring to all possible things, and not merely to those which happen to exist. No collection of facts can constitute a law, for the law goes beyond any accomplished facts and determines how facts that *may be*, but *all* of which never can have happened, shall be characterized. There is no objection to saying that a law is a general fact, provided it be understood that the general has an admixture of potentiality in it, so that no congeries of actions here and now can ever make a general fact. As *general*, the law, or general fact, concerns the potential world of quality, while as *fact*, it concerns the actual world of actuality. Just as action requires a peculiar kind of subject, matter, which is foreign to mere quality, so law requires a peculiar kind of subject, the thought, or, as the phrase in this connection is, the *mind*, as a peculiar kind of subject foreign to mere individual action. Law, then, is something as remote

from both quality and action as these are remote from one another.

421. Having thus by observation satisfied ourselves that there are these three categories of elements of phenomena, let us endeavor to analyze the nature of each, and try to find out why there should be these three categories and no others. This reason, when we find it, ought to be interesting to mathematicians; for it will be found to coincide with the most fundamental characteristic of the most universal of the mathematical hypotheses, I mean that of number.

§2. QUALITY

422 What, then, is a *quality*?

Before answering this, it will be well to say what it is not. It is not anything which is dependent, in its being, upon mind, whether in the form of sense or in that of thought. Nor is it dependent, in its being, upon the fact that some material thing possesses it. That quality is dependent upon sense is the great error of the conceptualists. That it is dependent upon the subject in which it is realized is the great error of all the nominalistic schools. A quality is a mere abstract potentiality, and the error of those schools lies in holding that the potential, or possible, is nothing but what the actual makes it to be. It is the error of maintaining that the whole alone is something, and its components, however essential to it, are nothing. The refutation of the position consists in showing that nobody does, or can, in the light of good sense, consistently retain it. The moment the fusillade of controversy ceases they repose on other conceptions. First, that the quality of red depends on anybody actually seeing it, so that red things are no longer red in the dark, is a denial of common sense. I ask the conceptualist, do you really mean to say that in the dark it is no longer true that red bodies are capable of transmitting the light at the lower end of the spectrum? Do you mean to say that a piece of iron not actually under pressure has lost its power of resisting pressure? If so, you must either hold that those bodies under the circumstances supposed assume the opposite properties, or you must hold that they become indeterminate in those respects. If you hold that the red body in the dark acquires a power of absorbing the long waves of the spectrum, and that

the iron acquires a power of condensation under small pressure, then, while you adopt an opinion without any facts to support it, you still admit that qualities exist while they are not actually perceived — only you transfer this belief to qualities which there is no ground for believing in. If, however, you hold that the bodies become indeterminate in regard to the qualities they are not actually perceived to possess, then, since this is the case at any moment in regard to the vast majority of the qualities of all bodies, you must hold that generals exist. In other words, it is concrete things you do not believe in, qualities, that is, generals — which is another word for the same thing — you not only believe in but believe that they alone compose the universe. Consistency, therefore, obliges you to say that the red body is red (or has some color) in the dark, and that the hard body has some degree of hardness when nothing is pressing upon it. If you attempt to escape the refutation by a distinction between qualities that are real, namely the mechanical qualities, and qualities that are not real, sensible qualities, you may be left there, because you have granted the essential point. At the same time, every modern psychologist will pronounce your distinction untenable. You forget perhaps that a realist fully admits that a sense-quality is only a possibility of sensation, but he thinks a possibility remains possible when it is not actual. The sensation is requisite for its apprehension, but no sensation nor sense-faculty is requisite for the possibility which is the being of the quality. Let us not put the cart before the horse, nor the evolved actuality before the possibility as if the latter *involved* what it only *enables*. A similar answer may be made to the other nominalists. It is impossible to hold consistently that a quality only exists when it actually inheres in a body. If that were so, nothing but individual facts would be true. Laws would be fictions, and, in fact, the nominalist does object to the word "law," and prefers "uniformity" to express his conviction that so far as the law expresses what only *might* happen, but does not, it is nugatory. If, however, no law subsists other than an expression of actual facts, the future is entirely indeterminate and so is general to the highest degree. Indeed nothing would exist but the instantaneous state; whereas it is easy to show that if we are going to be so free in our elements fictions an instant is the

first thing to be called fictitious. But I confess I do not take pains accurately to answer a doctrine so monstrous, and just at present out of vogue.

423 So much for what quality is not. Now what is it? We do not care what meaning the usages of language may attach to the word. We have already seen clearly that the elements of phenomena are of three categories, quality, fact, and thought. The question we have to consider is how quality shall be defined so as to preserve the truth of that division. In order to ascertain this, we must consider how qualities are apprehended and from what point of view they become emphatic in thought, and note what it is that will and must be revealed in that mode of apprehension.

424. There is a point of view from which the whole universe of phenomena appears to be made up of nothing but sensible qualities. What is that point of view? It is that in which we attend to each part as it appears in itself, in its own suchness, while we disregard the connections. Red, sour, toothache are each *sui generis* and indescribable. In themselves, that is all there is to be said about them. Imagine at once a toothache, a splitting headache, a jammed finger, a corn on the foot, a burn, and a colic, not necessarily as existing at once — leave that vague — and attend not to the parts of the imagination but to the resultant impression. That will give an idea of a general quality of pain. We see that the idea of a quality is the idea of a phenomenon or partial phenomenon considered as a monad, without reference to its parts or components and without reference to anything else. We must not consider whether it exists, or is only imaginary, because existence depends on its subject having a place in the general system of the universe. An element separated from everything else and in no world but itself, may be said, when we come to reflect upon its isolation, to be merely potential. But we must not even attend to any determinate absence of other things; we are to consider the total as a unit. We may term this aspect of a phenomenon the *monadic* aspect of it. The quality is what presents itself in the *monadic* aspect.

425. The phenomenon may be ever so complex and heterogeneous. That circumstance will make no particular difference in the quality. It will make it more general. But one quality

is in itself, in its monadic aspect, no more general than another. The resultant effect has no parts. The quality in itself is indecomposable and *sui generis*. When we say that qualities are general, are partial determinations, are mere potentialities, etc., all that is true of qualities reflected upon, but these things do not belong to the quality-element of experience.

426. Experience is the course of life. The world is that which experience inculcates. Quality is the monadic element of the world. Anything whatever, however complex and heterogeneous, has its quality *sui generis*, its possibility of sensation, would our senses only respond to it. But in saying this, we are straying from the domain of the monad into that of the dyad, and such truths are best postponed until we come to discuss the dyad.

§3. FACT

427. Next, what is *fact*?

As before, it is not the usage of language which we seek to learn, but what must be the description of fact in order that our division of the elements of phenomena into the categories of quality, fact, and law may not only be true, but also have the utmost possible value, being governed by those same characteristics which really dominate the phenomenal world. It is first requisite to point out something which must be excluded from the category of fact. This is the general, and with it the permanent or eternal (for permanence is a species of generality), and the conditional (which equally involves generality). Generality is either of that negative sort which belongs to the merely potential, as such, and this is peculiar to the category of quality, or it is of that positive kind which belongs to conditional necessity, and this is peculiar to the category of law. These exclusions leave for the category of fact, first, that which the logicians call the *contingent*, that is, the accidentally actual, and second, whatever involves an unconditional necessity, that is, force without law or reason, *brute* force.

428. It may be said that there is no such phenomenon in the universe as brute force, or freedom of will, and nothing accidental. I do not assent to either opinion, but granting that both are correct, it still remains true that considering a single action by itself, apart from all others and, therefore,

apart from the governing uniformity, it is in itself brute, whether it show brute *force* or not. I shall presently point out a sense in which it does display force. That it is possible for a phenomenon in *some* sense to present force to our notice without emphasizing any element of law, is familiar to everybody. We often regard our own exertions of will in that way. In like manner, if we consider any state of an individual thing, putting aside other things, we have a phenomenon which is actual, but *in itself* is not necessitated. It is not pretended that what is here termed fact is the whole phenomenon, but only an element of the phenomenon -- so much as belongs to a particular place and time. That when more is taken into account, the observer finds himself in the realm of law in every case, I fully admit. (Nor does that conflict with tychism *)

429 On the other hand, if the view be limited to any part of the phenomenal world, however great, and this be looked upon as a monad, entirely regardless of its parts, nothing is presented to the observer but a quality. How much, then, must we attend to, in order to perceive the pure element of fact? There are certain occurrences which, when they come to our notice, we set down as "accidental." Now, although there is really no more of the factual element in these than in other facts, yet the circumstance that we call them *par excellence* contingent, or "accidental," would lead us to expect that which distinguishes the realm of fact from the realms of quality and of law, to be particularly prominent in them. We call such facts "coincidences," a name which implies that our attention is called in them to the coming together of two things. Two phenomena, and but two, are required to constitute a coincidence; and if there are more than two no new form of relationship appears further than a complication of pairs. Two phenomena, whose parts are not attended to, cannot display any law, or regularity. *Three* dots may be placed in a straight line, which is a kind of regularity, or they may be placed at the vertices of an equilateral triangle, which is another kind of regularity. But *two* dots cannot be placed in any particularly regular way, since there is but one way in which they can be placed, unless they were set together, when they would cease to be two. It is true that on the earth two dots may be placed

* See vol. 6, bk I, ch. 2, and 6.102.

antipodally But that is only one of the exceptions that prove the rule, because the earth is a third object there taken into account So two straight lines in a plane can be set at right angles, which is a sort of regularity. But this is another rule proving exception, since $\angle AOB$ is made equal to $\angle BOC$ Now those angles are distinguished by being formed of two different parts of the line AC , so that really three things, OA , OB , and OC are considered So much for accidental actuality The type of brute force is the exertion of animal strength. Suppose I have long ago determined how and when I will act. It still remains to perform the act That element of the whole operation is purely brute execution Now observe that I cannot exert strength all alone I can only exert my strength if there be something to resist me Again duality is prominent, and this time in a [more] obtrusively dual way than before, because the two units are in two different relations the one to the other. In the coincidence the two phenomena are related in one way to one another It is a monoidal dyad But in the exertion of strength, although I act on the object and the object acts on me, which are two relations of one kind and joined in one reaction, yet in each of these two relations there is an agent and a patient, a doer and a sufferer, which are in contrary attitudes to one another So that the action consists of two monoid dyads oppositely situated

430. All this renders it quite certain that the nature of fact is in some way connected with the number two, and that of law with three or some higher number or numbers, just as we have already seen that quality is described by means of the number one But although it is hardly more than might be expected to find that a particular category of the constituents of phenomena has a special capacity for relations of a certain form — that some are too complex to suit this matter, while others [are] too simple to call into action its distinctive powers — and that in that way that category comes to have an intimate affinity with a certain formal conception, yet it would certainly be astonishing if it should turn out that material constituents of phenomena were coextensive with formal ideas We consequently wish to discover just what the connection of the dyad with fact is We shall do well to postpone the consideration of those facts which seem to involve a triad, such as a process

with beginning, middle and end, until we have examined the nature of law. For we naturally suspect, after what has been pointed out above, that where there is a threeness in a fact, there an element of generality may lurk. Putting aside then, for the present, triadic facts, we may add to the properties of fact already noticed such others as may seem worth mention, and may then turn to the consideration of duality, its properties and different formal types, so as to compare these with what is to be remarked in regard to fact.

431. Whenever we come to know a fact it is by its resisting us. A man may walk down Wall Street debating within himself the existence of an external world; but if in his brown study he jostles up against somebody who angrily draws off and knocks him down, the sceptic is unlikely to carry his scepticism so far as to doubt whether anything beside the ego was concerned in that phenomenon. The resistance shows him that something independent of him is there. When anything strikes upon the senses the mind's train of thought is always interrupted, for if it were not, nothing would distinguish the new observation from a fancy. Now there is always a resistance to interruption, so that on the whole the difference between the operation of receiving a sensation and that of exerting the will is merely a difference of degree. We may, however, learn of a fact indirectly. Either the fact was experienced directly by some other person whose testimony comes to us, or else we know it by some physical effect of it. Thus we remark that the physical effects of a fact can take the place of experience of the fact by a witness. Hence, when we pass from the consideration of the appearance of a fact in experience to its existence in the world of fact, we pass from regarding the appearance as depending on opposition to our will to regarding the existence as depending on physical effects.

432. There can hardly be a doubt that the existence of a fact does consist in the existence of all its consequences. That is to say, if all the consequences of a supposed fact are real facts, that makes the supposed fact to be a real one. If, for example, something supposed to be a hard body acts in every respect like such a body, that constitutes the reality of that hard body; and if two seeming particles act in every respect as if they were attracting particles, that makes them really so.

This may be expressed by saying that the fact fights its way into existence, for it exists by virtue of the oppositions which it involves. It does not exist, like a quality, by anything essential, by anything that a mere definition could express. That does not help its mode of being. It might hinder it, because where there is not a unit there cannot be a pair, and where there is not a quality there cannot be a fact; or where there is not possibility there cannot be actuality. But that which gives actuality is opposition. The fact "takes place." It has its here and now; and into that place it must crowd its way. For just as we can only know facts by their acting upon us, and resisting our brute will (I say *brute* will, because after I have determined how and when I will exert my strength, the mere action itself is in itself brute and unreasoning), so we can only conceive a fact as gaining reality by actions against other realities. And further to say that something has a mode of being which lies not in itself but in its being over against a second thing, is to say that that mode of being is the *existence* which belongs to fact.

433. The same conclusion can be reached by another line of thought. There are different kinds of existence. There is the existence of physical actions, there is the existence of psychical volitions, there is the existence of all time, there is the existence of the present, there is the existence of material things, there is the existence of the creations of one of Shakespeare's plays, and, for aught we know, there may be another creation with a space and time of its own in which things may exist. Each kind of existence consists in having a place among the total collection of such a universe. It consists in being a second to any object in such universe taken as first. It is not time and space which produce this character. It is rather this character which for its realization calls for something like time and space.

434. When we speak of a fact as *individual*, or not general, we mean to attribute to it two characters each of which is altogether peculiar to facts. One of these is the character just described, the other having a mode of being independent of any qualities or determinations, or, as we may say, having brute fighting force, or self-assertion. The individual fact insists on being here irrespective of any reason, whether it be true or not.

that when we take a broader view we are able to see that, without reason, it never could have been endowed with that insistency. This character makes a gulf between the *individual* fact and the *general* fact, or law, as well as between the individual *fact* and any quality, or mere possibility, which only mildly hopes it won't be intruding. But besides that character, individuality implies another, which is that the individual is determinate in regard to every possibility, or quality, either as possessing it or as not possessing it. This is the principle of excluded middle, which does not hold for anything general, because the general is partially indeterminate; and any philosophy which does not do full justice to the element of fact in the world (of which there are many, so remote is the philosopher's high walled garden from the market place of life, where fact holds sway), will be sure sooner or later to become entangled in a quarrel with this principle of excluded middle.

435. Thus far in this section, attention has been called successively (but in no philosophical sequence) to six characteristic features of fact. In recollecting them, we may place at their head the circumstance that fact has distinct features, for this distinguishes it from quality although not from law. The others already examined have been as follows: second, facts are either accidentally actual or involve brute force; third, every fact has a here and now; fourth, fact is intimately associated with the dyad, fifth, every fact is the sum of its consequences; sixth, the existence of facts consists in fight; seventh, every fact is determinate in reference to every character. But in making our distribution of the elements of phenomena into quality, fact, and law, we were led to notice additional features of fact. I continue to take them up promiscuously.

436. The eighth feature of fact is that every fact has a subject, which is the grammatical subject of the sentence that asserts the existence of the fact. Indeed, in a logical sense, there are two subjects; for the fact concerns two things. One of these two subjects, at least, is a *thing* itself of the nature of fact, or we may express this in other words by saying that the existence of this subject is a fact. This subject is a *thing*. It has its here and now. It is the sum of all its characters, or consequences. Its existence does not depend upon any definition,

but consists in its reacting against the other things of the universe. Of it every quality whatever is either true or false. That this subject, whose actions all have single objects, is material, or physical substance, or *body*, not a psychical subject, we shall see when we come to consider psychical subjects in discussing the nature of law. This does not in the least contradict idealism, or the doctrine that material bodies, when the whole phenomenon is considered, are seen to have a psychical substratum.

437. The ninth feature of fact is that every fact is connected with a reciprocal fact, which may, or may not, be inextricably bound up with it. If one body strikes upon another, that second body reciprocally strikes upon it, and the two facts are inseparable. But if one body is hard, there must be a second body of some degree of hardness for the former to resist. Yet the annihilation of the second body would [not] destroy the hardness of the first. It would not affect it, for any other body that might grow hard at any time and the first body, remaining unaffected, would realize its hardness whenever the impact with the other should happen to occur. Here, therefore, the reciprocal fact is not so inseparable from the other. If a solid body suddenly melts, it will at once flow into the vacant parts of its vessel, and the beginning to any such consequent fact will be a change reciprocal to the first change. But there is no particular consequence which will be inseparable from the melting, perhaps. There may or may not be. So we see that the division between facts inseparable from reciprocal facts is not coincident with a division of facts into those whose reciprocal facts are separable and those whose reciprocal facts are inseparable.

438. The tenth feature of fact, which has just been illustrated is that its natural classification takes place by dichotomies.

439. The eleventh feature of dual fact is that if it involves any variation in time, this variation consists of a change in the qualities of its subjects, but never the annihilation or production of those subjects. We may indeed, conceive of an action by which something is produced or destroyed. But either a third subject will be concerned, so that the fact is one of those the study of which we have expressly postponed, or the action

is produced or destroyed will be one of those facts whose reciprocal facts are separable. If a star suddenly bursts into view, when no external subject caused it to do so, then, just as the appearance will be irrefragable demonstration that something dark was there before, so the fact itself will constitute the previous existence of its subject. For this is the only method by which we can deduce metaphysical truths. Consequently, bodies, and the subjects of facts generally, are permanent and eternal.

410 The twelfth feature of fact is that it is accidental. That is to say, even if it involves brute force, and though that force be governed by a law which requires the acting body continually to exert this force, yet nevertheless the individual action is not involved in the existence of the fact, but on the contrary is something that can only happen by having a subject with an independent mode of being not dependent upon this nor upon any determination whatsoever. It is something which *happens*.

I have taken no pains to make this promiscuous list of properties of fact complete, having only cared that it should be sufficient to enable us to compare the characters of fact with those of duality and thus ultimately to attain an understanding of why all phenomena should be composed of quality, fact, and law

§1. DYADS*

441. Let us now inquire what is involved in the conception of *two*, and in particular by what features a pair is distinguished from a single *one*, on the one hand, and from three, or any larger set, on the other.

442. A mathematician will be inclined to pronounce this the most ridiculously trifling question to be called a problem that could well be imagined. A pair, he may say, is just an object and an object, and that is all that is involved in this puffed-category of the *dyad*. But any logician will tell him that *that* statement, at any rate, is inaccurate. For the purposes of the logic of mathematics it is fatally inaccurate. A married couple is not a man. Neither is it a woman, and *a fortiori* it is not, at once, a man and a woman. Nor is it dis-

* Cf. vol. 3, No. XVIII.

junctively either a man or a woman. It is a third object, to whose constitution, which is its nature, and therefore to its existence, too, a man is requisite and a woman is requisite. A pair is an object to whose constitution a subject and another subject are necessary and sufficient. This corresponds to a part of feature number eight of fact.

443 But accepting this amendment, which to his customary way of thinking is microscopic, the mathematician will be inclined to say, here is a perfect definition, and excepting a few little corollaries, there is nothing more to be said of the dyad. It behooves me, then, to clearly state what the inquiry is which I propose to institute. It is not a mathematical inquiry, because the business of the mathematician is to frame an arbitrary hypothesis, which must be perfectly distinct at the outset, so far, at least, as concerns those features of it upon which mathematical reasoning can turn, and then to deduce from this hypothesis such necessary consequences as can be drawn by diagrammatical reasoning. The present problem is one of logical analysis. Instead of setting out with a distinct hypothesis of a diagrammatic kind, we have the confused fact that a dyad is a conception of the highest utility, though we are not prepared to say exactly what its nature is, nor even, in all cases, whether a given case should properly be reckoned as a duality or not. We are somewhat in the position of a naturalist who knows that whales are large swimming animals, which spout water, and yield blubber, spermaceti, and whalebone, but knows little else about them, and who proposes to himself to examine the anatomy and physiology of whales so as to assign them their place in the system of the animal kingdom. He does not intend to preserve the popular description nor delimitation of the class of whales. He will perhaps see reason to extend the name to some animals not popularly called whales and to refuse it to others that are so called. He will also subdivide the group, and classify it according to the facts. So far as our inquiry is a logical analysis, the greatest difference between it and that of a taxonomic biologist consists in the circumstance that we are not forced to institute special observations, because all the facts are either well known or can be ascertained by careful reflection upon those that are known.

444 But besides being logical in the sense of demanding

a logical analysis, our inquiry also relates to *two* as a conception of logic. The term "logic" is uncontentiously by me employed in two distinct senses. In its narrower sense, it is the science of the necessary conditions of the attainment of truth. In its broader sense, it is the science of the necessary laws of thought, or, still better (thought always taking place by means of signs), it is general semiotic, treating not merely of truth, but also of the general conditions of signs being signs (which Duns Scotus called *grammatica speculativa*), and of the laws of the evolution of thought, which since it coincides with the study of the necessary conditions of the transmission of meaning by signs from mind to mind, and from one state of mind to another, ought, for the sake of taking advantage of an old association of terms, be called *rhetorica speculativa*; but which I content myself with inaccurately calling *objective logic*, because that conveys the correct idea that it is like Hegel's logic. The present inquiry is a logical one in the broad sense. It is a study of dyads in the necessary forms of signs.

Our method must be to observe how logic requires us to think and especially to reason, and to attribute to the conception of the dyad those characters which it must have in order to answer the requirements of logic.

415 We can at once see that a pair, having a structure, must present a variety of features, and this is a character in which the dyad differs markedly from the monad, which having no structure nor parts in any sense, is bare of all features except that each *one* is something peculiar. This corresponds to feature number one of fact.

446 A monad has no units. This sounds paradoxical, and seems to the mathematician an *aperçu* from an arbitrary point of view, but we soon see that it is the suitable point of view for logical purposes. In the pair there are unit parts, and so there are in all higher sets. Let us inquire, then, what is the function of the units of a set in the constitution of that set. We must first remark that in logic a set cannot generally be adequately represented by a diagram of a promiscuous collection of dots. Of the multitudinous examples of this in mathematics it will be sufficient to call to mind the constituents of a determinant, and how they have to be arrayed in a square block. As a

* *Opera Omnia Collecta*, L. Durand, T 1, pp 45-76

general rule, the form of connection (or a part of it, at least) must be considered in logic in case a set has to be considered as such. This form of connection belongs to the set and not to its units. Now reasoning is formal. That is to say, whatever inference is sound concerning one thing or one character is sound in regard to any other thing or character whose form of connection (so far as it need be considered) is strictly analogous to that of the former. All that has to be represented, then, for the purposes of logic, is the characters of the sets themselves, and the units need exhibit nothing except what is requisite to the exhibition of the characters belonging to sets. What, then, is the use of the units, at all? And how can they, when thus stripped of all qualities, contribute to the representation of characters of sets? The answer is that if all that were desired was to present for contemplation the character of a set, the statement of the mode of its connection in abstract terms, with no particular reference to the units, would be sufficient, and in point of fact, this is the general form which metaphysicians give to their statements, so far as the usages of speech render it convenient. But when, one set having been represented, it is desired to attach to it the representation of another set, and there is a unit or units which belong to both sets, then in order to show how the total set is composed of those two sets, it is necessary to take account of the identities of their common units. Now identity is a relation which cannot be implied by a general description of the identical things, and the descriptions of the sets, so far as they leave out the individual things, are general. Hence, it follows that the only purpose in indicating the units in the representation of the set, is in order that each of them may signify its identity with an individual of another set. The identity of different units of the same set might be similarly represented. Hence, passing from the representation of the set, to the set itself, as it is logically conceived, the only function of the units in it is to establish possible identities with the units of other sets. A unit, therefore, is something essential to a set whose existence consists in its possible identity with another unit of the same or another set. Now, identity is essentially a dual relation. That is, it requires two subjects and no more. If three objects are identical, this fact is entirely contained in the fact that the three

pairs of objects are identical. Hence a unit is something whose existence consists in a possible dyad of which it is the subject. Thus, there is an element of twoness in every set. So I was right in saying that the monad has no unit, since the monad in no wise involves the dyad.

447. There are certain truths about quality not considered in Section 2. for the reason that they were considered as belonging under the head of the dyad. They do not concern the monad in its aspect as one, but are dyads of monads. One of these is that whatever is a possible aspect irrespective of parts has possible parts. I mean that any object presenting a quality in its purity might be further determined. Every quality is, in itself, general. Given any possible determination, there is a possible further determination. In the beginning was nullity, or absolute indetermination, which, considered as the possibility of all determination, is being. A monad is a determination *per se*. Every determination gives a possibility of further determination. When we come to the dyad, we have the unit, which is, in itself, entirely without determination, and whose existence lies in the possibility of an identical opposite, or of being indeterminately over against itself alone, with a determinate opposition, or over-againstness, besides.

It follows that a set considered apart from its units is a monad. In fact, in not considering the units, we allow all sets of the same general character to collect before us, and regard those sets as a monad without parts.

But a set considered as made up of units in a peculiar connection is a dyad if its units are two, a triad if they are three, etc. A part of the above corresponds to feature number eight of fact.

448. Let us further examine the dyads of monads just mentioned. But before doing so, this designation has to be defended. It may be objected, with apparent force, that the truth just mentioned about quality is general, and that, as general, it applies to innumerable qualities and not to a pair. This is perfectly true; but then, all that we are inquiring into concerning the monad, the dyad, and plural sets, is general, and therefore, from that point of view we are not studying the monad and the dyad at all, but polyads of monads and dyads.

This is true. Our thought is rational and, as such, general, or of the plural nature. But it relates to the monad and the dyad in part. So the truth just mentioned is general, but it relates to a single monad, any monad, and declares of it that a monad exists which is, for thought, equivalent to that monad further determined.

449. This is one of three regulative laws of logic of high importance which were enunciated by Kant in the *Critic of the Pure Reason* *. The other two are that there is a determination less than and included in any possible determination, and that between any two determinations, one included in the other, a third may be found. Besides these dyads, both whose subjects are monads, there are also certain dyads, one of whose subjects is a monad and the other a possible dyad, that is, a unit. And there are general laws connected with these.

450. The first of these is that any unit (or units) whatsoever contemplated in itself without conscious regard to its parts would, were our sense to respond to it, be seen to embody a monad. De Morgan propounded this law, so far as it is pertinent to formal logic, affirming that any collection of objects whatsoever possess universally some character which belongs to no other object at all. For, said he, they at least possess the character of being units of that collection. Considered as a *proof*, this begs the question, but considered as another way of formulating the same phenomenon, and as a way which throws some light upon it, it has its value. This coincides with the principle of excluded middle. Those objects of the universe which do not possess a given character possess another character which, in reference to that universe, is in the relation of negation to the first. Hence, it is impossible to form a single class of dyads, two classes of dyads must be formed at once. Hence, considering all the monads which can appear on the contemplation of sets of units of the universe in their monadic aspect, every single unit is determined to be one subject of a dyad which has any one of those monads as its second subject, namely it is either such a dyad as determines it to have the character of being one of the units which made up the object of the contemplation in which that monad appeared or it is

* Appendix to the "Transcendental Dialectic"

such a dyad as determines the unit to have the character belonging to all the other units of the universe

451. What has been here affirmed of collections of units is equally true of collections of monads. Namely, any monads may be contemplated together, and in their monadic aspect without regard to the single monads are seen to be one monad. There is thus a relation between monads similar to the relation of a unit to a monad. But there is this difference in the two cases: a monad thus embraced under another monad is so embraced in its very mode of being, while that a unit should be embraced under a monad has no concern with the mode of existence of the unit, which lies in its brute self-identity and otherness from all the rest. It is on the contrary an adventitious circumstance that this particular unit is embraced under this monad.

This corresponds to feature number seven and in part to feature number twelve of fact

452. The metaphysical categories of quality, fact, and law, being categories of the matter of phenomena, do not precisely correspond with the logical categories of the monad, the dyad, and the polyad or higher set, since these are categories of the forms of experience. The dyads of monads, being dyads, belong to the category of the dyad. But since they are composed of monads as their sole matter, they belong materially to the category of quality, or the monad in its material mode of being. It cannot be regarded as a *fact* that scarlet is red. It is a *truth*, but it is only an essential truth. It is that in being which corresponds in thought to Kant's analytical judgment. It is a dyadism latent in monads.

453. I may pause here a moment to remark that when I say nullity consists of the possibility of the monad; that the unit consists of the possibility of the dyad, and the like, such statements have a Hegelian sound. Undoubtedly they are intrinsically of that nature. I follow an order of evolution in such phrases, the possibility evolves the actuality. So does Hegel. He reaches each category from the last preceding by virtually calling "next!" What his process [is] of making the next come and of recognizing it when it emerges is, however important it may be, yet, comparatively speaking a detail, wherein I sometimes agree with the great idealist and sometimes diverge

from his footsteps — for my own method has resulted from a more deliberate examination of the exact theory of logic (in which Hegel's age, and especially his own country, and more especially he himself were decidedly weak), and consequently has a broader form, capable of diversification to adapt itself to the special form of the germinal conception. It is not yet time to formulate it. I apply it, the reader follows it with approval if he can, and a later review will show what the laws of the procedure have unconsciously been.

454 The most important division of dyads is with reference to the character of their subjects. For subjects differ in regard to the nature of the dyads which they are capable of forming. They are either dyads formed merely from monads or they are dyads into which enter objects having a dyadic mode of being, that is, individual things, or units.

455 Dyads of the former kind are seen to subsist as soon as the two monads are regarded together, and arguing from knowledge to being (that is, merely abstracting from the imported idea of a knower), they do subsist in so far as the two monads are compossible, that is in so far as both are such monads as they are. When scarlet and red are contemplated together, the former as first, the latter as second, a certain aspect *sui generis* presents itself, like that which presents itself when toothache and ache are contemplated together, the former first, the latter second. This kind of dyadism or dyadic relation which is evolved from the very being of the subjects as soon as they are together, I call an *essential* dyadic relation, and the dyad so formed an *essential dyad*. This is the only kind of dyad that can be composed out of monads alone, because monads having no parts nor distinct features cannot, whether singly or collectively, have any characters except those which spring directly from their several beings *sui generis*.

456 Dyads that are *accidental*, that is, are collective characters of their subjects adventitious to their being, must therefore concern subjects (or one subject at least) which is not a monad, and consequently having a mode of being over and above what its mere inward suchness involves. It must have a mode of being gained by its opposition to another, that suchness does not avail to confer. What is this mode of being in its most general terms? In order that our conception of it may

embrace every variety, let it begin as soon as the mode of being of the monad ends. Combine quality with quality after quality and what is the mode of being which such determinations approach indefinitely but altogether fail ever to attain? It is, as logicians have always taught, the *existence* of the individual. Individual existence whether of a thing or of a fact is the first mode of being that suchness fails to confer. Suchness, or the mode of being of the monad, is the mere possibility of an existent.

457 Existence is that mode of being which lies in opposition to another. To say that a table exists is to say that it is hard, heavy, opaque, resonant, that is, produces immediate effects upon the senses, and also that it produces purely physical effects, attracts the earth (that is, is heavy), dynamically reacts against other things (that is, has inertia), resists pressure (that is, is elastic), has a definite capacity for heat, etc. To say there is a phantom table by the side of it incapable of affecting any senses or of producing any physical effects whatever, is to speak of an imaginary table. A thing without oppositions *ipso facto* does not exist. Of course, the question arises, if everything that exists exists by its reactions, how does the total collection of things exist? This is a legitimate and valuable question, the answer to which brings out a new idea. But this is not the time to consider it. Our purpose of developing the complete scheme of philosophical ideas is defeated unless we take up the points one by one in their due order. That question about the totality of things throws no doubt upon the manifest truth that existence lies in opposition, and the very fact that the consideration of it would lead to a still more developed philosophy is the very reason why it must be postponed until we have mastered the conception of being through opposition.* Not only is this opposition essential to an individual thing or subject, but also to an individual fact. Its truth, or existence, is the sum of its effects

458. *Hic et nunc* is the phrase perpetually in the mouth of Duns Scotus, who first elucidated individual existence. It is a forcible phrase if understood as Duns did understand it, not as describing individual existence, but as suggesting it by an example of the attributes found in this world to accompany it. Two drops of water retain each its identity and opposition to

* See 6.415.

the other no matter in what or in how many respects they are alike. Even could they interpenetrate one another like optical images (which are also individual), they would nevertheless react, though perhaps not at that moment, and by virtue of that reaction would retain their identities. The point to be remarked is that the qualities of the individual thing, however permanent they may be, neither help nor hinder its identical existence. However permanent and peculiar those qualities may be, they are but *accidents*; that is to say, they are not involved in the mode of being of the thing, for the mode of being of the individual thing is existence; and existence lies in opposition merely.

459. We observe no life in chemical atoms. They appear to have no organs by which they could act. Nor can any action proper gain actuality, that is, a place in the world of actions, for any subject. Yet the individual atom exists, not at all in obedience to any physical law which would be violated if it never had existed, nor by virtue of any qualities whatsoever, but simply by virtue of its arbitrarily interfering with other atoms, whether in the way of attraction or repulsion. We can hardly help saying that it blindly forces a place for itself in the universe, or willfully crowds its way in.

460. No reaction among individual things can create one of those things nor destroy it, for before its existence or after it there would not be anything to react. So that the fountain of existence must be sought elsewhere.

461. Existence, though brought about by dyadism, or opposition, as its proper determination, yet, when brought about, lies *abstractly and in itself considered*, within itself. It is numerical identity, which is a dyadic relation of a subject to itself of which nothing but an existent individual is capable. It is to be observed that numerical identity is not empty verbiage, as the identity of a quality with itself is, but is a positive fact. This is due to the possibility of the individual's assuming different accidents. Throughout all vicissitudes its oppositions to other things remain intact, although they may be accidentally modified; and therein is manifest the positive character of identity.

462. The only primary essential dyadism is that between a containing monadic quality and a contained monadic quality.

For qualities cannot resemble one another nor contrast with one another unless in respect to a third quality; so that the resemblance of qualities is triadic. This, however, is a point calling for reëxamination in a future revision of this analysis. If I am right, there is no further logical distinction between essential dyads

463 But with regard to accidental dyads the case is far otherwise. We must at once divide them into those of which one subject is a monad, and those of which neither subject is a monad. This division is closely allied to and immediately suggested by the last. Dyads of the former kind may be termed *inherential* — as, this thing possesses redness; those of the latter kind may be called *relational*

464. An inherential dyad strongly resembles an essential dyad. Begin with any quality, as high-colored, and form an essential dyad, as *red is high-colored*. Form another with red as second subject; as, *scarlet is red*. Form another with scarlet as second subject; as, *mercuric-iodide-color is scarlet*. So we may conceive determination added to determination, and at the limit a color so specific that it can only belong to an individual object. This I say is the limit which lies just beyond the possible, but is indefinitely approachable. This limit is a dyad of inherence. It is, after all, however, radically different from the essential dyad, because the quality of the subject of inherence is a mere accident of that individual. Inherence may be regarded from another point of view. Namely, the individual subject may be conceived as brought into relation to itself by the possession of the attribute.

465. Relational dyads are not further divisible in regard to the metaphysical character of their subjects. But they are divisible in regard to the nature of the connection between their subjects. And, first of all, a division is suggested by the last remark concerning inherential dyads. Namely, every relational dyad is either a *dyad of identity*, in which the two subjects are existentially one and the same, or it is a *dyad of diversity*, in which the subjects are existentially two and distinct. This relational identity is not the identity of inherence, but the identity which is altogether independent of any accident or accidents. It will, however, involve such inferences as may belong to the individual and identical subject.

466 With this division another is closely connected, namely, a dyad of diversity may either be such that the connection between its units consists merely in their agreement or difference in respect to a monadic quality, or it may be such that the connection of the units depends upon their possessing some dyadic character or characters. This distinction is most deeply engraved into the natures of dyads. For what is a dyadic character? It is a character conferred upon one individual by another individual. It thus involves the idea of *action* or *force*, not in a narrow scientific sense, but in the sense in which we speak of the will as a force. We may say then that this division is into *qualitative* and *dynamical* diversities. Or, in place of qualitative diversity, it will perhaps be better to use the familiar phrase *partial agreements*.

467. Dynamic dyads are, in the first place, distinguished into those which, by virtue of the characters which they attribute to their subjects, put those two subjects into like relations each to the other, and into those which, so far as the characters they attribute to their subjects go, leave a distinction between the reciprocal relations. The former kind may be called *materially unordered*, the latter, *materially ordered*. Thus, A is one mile from B is a materially unordered relation, but A kills B is materially ordered, notwithstanding that it may happen that B also kills A.

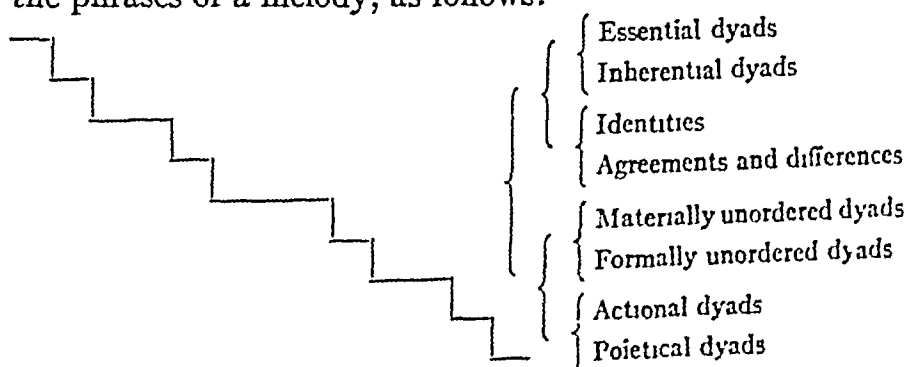
468 Closely connected with this distinction is another, namely, materially ordered dyads are divisible into those in which there is no existential or intrinsic distinction between the subjects as to which is first and which second, although in stating the fact language may require us to mark one as first and the other as second, and into those in which this distinction is existential. The former may be called *formally unordered* dyads, the latter *formally ordered*. Thus, when amber is rubbed against fur, one acquires resinous and the other vitreous electricity. The dyad is thus materially ordered. But, as far as we know, neither is to be regarded as distinctively agent or first in contradistinction to the patient, or second. When, however, of two oppositely electrified bodies one attracts the other, although the second equally attracts the first, yet the two attractions are distinct dyads and the attracting body is agent, or intrinsically first, while the attracted

body is intrinsically second. For one is determining and the other determined. Now the determining body is, in so far, left indeterminate; and indeterminacy, or possibility, as the character of the monad, is *first* relatively to determination, which, as essentially dyadic, is *second*.

469. There is no further room for distinction based upon the positions of the subjects; but the formally ordered dyads can still be divided with reference to the character of the dependence of one subject upon the other. Namely, this is either such that merely the monadic accidents of the second subject, or patient, are dependent upon the agent, or such that the dyadic existence of the patient is dependent upon the agent. The former may be termed *actional*, the latter *poietical*,* or *productive*, dyads

No further distinctions seem to be relevant to the idea of the present analysis

470. It will be remarked that the division is everywhere a dichotomy of the second of the two classes formed by the next preceding dichotomy. The result is that the ultimately undivided species form a staircase of successive steps. But the steps are not all equal. On the contrary, so thoroughly does twoness permeate the whole that the steps separate into successive pairs. There is also a marked distinction between the first pair of pairs and the second pair of pairs, which repeats the former with a variation. That is to say, the first pair of each of the two pairs of pairs arises from distinctions concerning the subjects, while the second pair of each pair of pairs arises from distinctions concerning the mode of connection of the subjects. The whole series of species of dyads are related like the phrases of a melody, as follows:



* From *ποιέω*.

is general, nor is it a matter of law, since thought is living

481 So much for the first order of subdivisions of the three classes of triads. Passing to the lower subdivisions, I find among those of the degenerate triads nothing of particular philosophical interest; though something may have been overlooked. But among the lower subdivisions of the genuine triads there is an abundance

482 We first consider the first two of the three chief divisions of genuine triads, which are the laws of quality and the laws of fact. The laws of quality are all of one type. Namely, they all simply determine systems of qualities, of which Sir Isaac Newton's law of color-mixture with Dr. Thomas Young's supplement thereto, is the most perfect known example

483 The laws of fact divide themselves at the outset into those which must be true if there be any true answer to every question that has a meaning, or, as we say, into laws *logically necessary* and laws *logically contingent*. To this division another is intimately connected. Namely, of laws logically contingent the most universal are of such a kind that they must be true provided every form which by logical necessity must be thought of a given subject is also a form of its real being. Calling this kind of necessity, metaphysical necessity, we may divide laws logically contingent into laws *metaphysically necessary* and laws *metaphysically contingent*.

484. The general law of quality, as distinct from the classificatory system of quality (of which we can have but a fragmentary knowledge), has three clauses, relating respectively to single qualities, to pairs of qualities, and to triads of qualities. The first clause is that every quality is perfect and in itself such as it is. The second more complex law is that two qualities have one or other of two sorts of relations to one another; namely, they may be, first, independent of one another, somewhat resembling and somewhat differing from one another, or secondly, one of them may be merely a further determination of the other, this latter being essentially the first of the pair in the order of evolution, or synthesis, while it is the second of the pair in the order of involution or analysis. The third clause relates to the respects or third qualities, in which two compared qualities agree or differ. The first of the respects is the quality of the quality, or, as we may say, the

hue, in which respect the tastes of sugar and salt differ, or the pitch of sounds, or the respect in which red, blue, and green differ. The second respect is the absolute intensity of the quality, loudness in sounds, luminosity in color, strength in tastes and smells, etc. The third respect is purity, or the relative intensity of the strongest elements. It is great in high colors and in musical sounds. In some cases strength and weakness have peculiar hues. Bright colors tend toward yellow, dim colors toward violet. Very faint sounds tend toward a certain pitch. Purity and impurity may have their peculiar hues.

485. The general law of logic has likewise its three clauses. The monadic clause is that fact is in its existence perfectly definite. Inquiry properly carried on will reach some definite and fixed result or approximate indefinitely toward that limit. *Every subject is existentially determinate with respect to each predicate.* The dyadic clause is that there are two and but two possible determinations of each subject with reference to each predicate, the affirmative and the negative. Not only is the dyadic character manifest by the double determination, but also by the double prescription, first that the possibilities are two at least, and second that they are two at most. The determination is not both affirmative and negative, but it is either one or the other. A third limiting form of determination belongs to any subject [with regard] to [some other] one whose mode of existence is of a lower order, [the limiting case involving] a relative *zero*, related to the subjects of the affirmation and the negation as an inconsistent hypothesis is to a consistent one. The triadic clause of the law of logic recognizes three elements in truth, the idea, or predicate, the fact or subject, the thought which originally put them together and recognizes they are together, from whence many things result, especially a threefold inferential process which either first follows the order of involution from living thought or ruling law, and existential case under the condition of the law to the predication of the idea of the law in that case, or second, proceeds from the living law and the inherence of the idea of that law in an existential case, to the subsumption of that case and to the condition of the law, or third, proceeds from the subsumption of an existential case under the condition of a living

law, and the inherence of the idea of that law in that case to the living law itself * Thus the law of logic governs the relations of different predicates of one subject

486. The general law of metaphysics is little understood. The attention of thinkers has been so rivetted upon the question of its truth, that they have largely overlooked the importance of determining precisely what it is, even if it be not absolutely true, since it is certainly the product of natural thought and of reasoning which, however far it may be carried beyond the legitimate conclusion, is nevertheless true reasoning of a valid type. The difficulty of making here any brief statement of any value is great enough for that reason. But besides that, brief statements of a metaphysical kind can hardly be made intelligible. I can only notice some items of the law going to exhibit the threefold division of the law.

487. Metaphysics consists in the results of the absolute acceptance of logical principles not merely as regulatively valid, but as truths of being. Accordingly, it is to be assumed that the universe has an explanation, the function of which, like that of every logical explanation, is to unify its observed variety. It follows that the root of all being is One, and so far as different subjects have a common character they partake of an identical being. This, or something like this, is the monadic clause of the law. Second, drawing a general induction from all observed facts, we find all realization of existence lies in opposition, such as attractions, repulsions, visibilities, and centres of potentiality generally. "The very hyssop on the wall grows in that chink because the whole universe could not prevent its growing." This is, or is a part of, a dyadic clause of the law. Under the third clause, we have, as a deduction from the principle that thought is the mirror of being, the law that the end of being and highest reality is the living impersonation of the idea that evolution generates. Whatever is real is the law of something less real. Stuart Mill defined matter as a permanent possibility of sensation †. What is a permanent possibility but a law? Atom acts on atom causing stress in the intervening matter. Thus force is the general fact of the states of atoms on the line. This is true of force in its whole

* Cf. 2620 ff.

† In his *Lectures on Logic*, Book II, Chapter I, § 1, p. 11.

sense, dyadism. That which corresponds to a general class of dyads is a representation of it, and the dyad is nothing but a conflux of representations. A general class of representations collected into one object is an organized thing, and the representation is that which many such things have in common. And so forth

488. Passing to laws that are metaphysically contingent, that is, to such as are not necessarily involved in the literal extension to being of the necessary laws of logical truth, we may first divide these into those which impose upon the subjects of dyadic existence forms of reaction analogous to those of logic, that is, the *laws of time* (by which they evade the laws of logic in regard to contrary inherences) and those which have no relation to logic. And with this division another is closely connected, namely, the division of the latter class of laws into those which are imposed upon objects as reacting upon one another existentially, as merely coexistent, which are the laws of *space* and into those which are only imposed upon objects in so far as their mode of existence is in its own metaphysical nature that of a subject, that is, laws of substantial things.

In regard to these two divisions a long and arduous philosophical discussion is quite ineluctable. It would be quite impracticable to summarize it in the present sketch of the shapes which are assumed by the three fundamental ideas of philosophy. All that can be done is to unfold in some measure the characteristics of the view here taken.

489. In the first place then, it is plain enough that the law of time is not a metaphysical law. Our logical instinct tells us that. We took as the typical example of a metaphysical law, the law that whatever exists, although its existence is a matter of brute fact, irrespective of any qualities must definitely possess or be without each monadic quality. Now we feel instinctively that the necessity of that is altogether higher than any necessity for the junctions, between the possessions by a subject of contrary attributes, to be related to one another like premisses and conclusions, as before and after. The one is the mere existential mirror of a law of logic. It is the requirement that that which is necessarily *true* (if there be any truth) shall be a part of the existential fact, and not merely of thought. But the other requires that the mere process of thought, which

logic regards as mental, and never insists upon predicating of the subject as true, shall itself be mirrored in existence. But while the law of time is not metaphysical, it is plainly, from that description of it, "next door to" a metaphysical law. This is the reason for making this division follow immediately after that into laws metaphysically necessary and contingent.

490. It will be very difficult for many minds — and for the very best and clearest minds, more difficult than for others — to comprehend the logical correctness of a view which does not put the assumption of time *before* either metaphysics or logic instead of *after* those kinds of necessity, as here arranged. But that is an objection, not to this particular item of the development, but to the general plan of it. To admit the force of the objection and carry it out to its consequences would simply result in reversing the whole order of development, making it begin with polyads, analyzing these into triads, and then finding dyads in triads, and monads in dyads. There is not only nothing erroneous in such an arrangement, but the conceptions cannot be thoroughly grasped until it has been carried out. But this is only one of two sides of the shield, both of which must be examined, and which have to be synthesized in the really philosophical view. The reason of this is, that although the view which takes the triad first is necessary to the understanding of any given point, yet it *cannot*, from the very nature of the case, be carried out in an entirely thoroughgoing manner. How, for instance, would you begin? By taking the triad *first*. You thus do, in spite of yourself, introduce the monadic idea of "first" at the very outset. To get at the idea of a monad, and especially to make it an accurate and clear conception, it is necessary to begin with the idea of a triad and find the monad-idea involved in it. But this is only a scaffolding necessary during the process of constructing the conception. When the conception has been constructed, the scaffolding may be removed, and the monad-idea will be there in all its abstract perfection. According to the path here pursued from monad to triad, from monadic triads to triadic triads, etc., we do not progress by logical involution — we do not say the monad *invokes* a dyad — but we pursue a path of evolution. That is to say, we say that to carry out and perfect the monad, we need next a dyad. This seems to be a vague method when stated in

general terms; but in each case, it turns out that deep study of each conception in all its features brings a clear perception that precisely a given next conception is called for.

491 So far Hegel is quite right. But he formulates the general procedure in too narrow a way, making it use no higher method than dilemma, instead of giving it an observational essence. The real formula is this: a conception is framed according to a certain precept, [then] having so obtained it, we proceed to notice features of it which, though necessarily involved in the precept, did not need to be taken into account in order to construct the conception.* These features we perceive take radically different shapes, and these shapes, we find, must be particularized, or decided between, before we can gain a more perfect grasp of the original conception. It is thus that thought is urged on in a predestined path. This is the true evolution of thought, of which Hegel's dilemmatic method is only a special character which the evolution is sometimes found to assume. The great danger of the evolutionary procedure lies in forcing steps that are not inevitable, in consequence of not having a sufficiently distinct apprehension of the features of the conception in hand to see what it is that must immediately succeed it. The idea of time must be employed in arriving at the conception of logical consecution; but the idea once obtained, the time-element may be omitted, thus leaving the logical sequence free from time. That done, time appears as an existential analogue of the logical flow.

492. Time is said to be the form of inward intuition. But this is an error of the sort just considered. It confuses what is evolved from the time-idea with what is involved in it. The task of the analyst in making out the features of the time-law must begin by formulating precisely what it is which that law explicitly pretends to make subject to time. It is, in the first place, only real events that "take place," or have dates, in real time. Imaginary events, the course of a romance, are represented as having relations *like* those of time among one another, but they have no real places in time. A historical romance connects itself, more or less definitely, with real time, but that is because it "makes believe" they [the imaginary events] are real events. It is, then, only existentially real events which

* Cf 6302.

the law of time represents really to have places in real time. What, then, is a real event? It is an existential junction of impossible facts. A pale yellowish iron solution mixed with a pale yellow solution of ferrocyanide of potassium suddenly turns deep blue. It is requisite that its being of a pale greenish or reddish yellow, and therefore not blue, should be a fact, and that the same thing's being blue should be a fact. Those two facts are contradictory. That is, that both should be true of precisely the same subject is absurd. But that they should be true of a subject existentially identical is not absurd, since they are mere accidents of an individual thing which, as such, has no essence, its mode of being consisting in its forcing itself into a place in the world. Still, the two accidents could not be combined with one another. That *would* be absurd. For these accidents are monadic qualities, do have essences, and these essences are disparate. Their combination would have the form of a monadic triad but would not be a possible monadic triad, for it would violate a logical law. But though the two inferences cannot be *combined*, they can be *joined*. This junction is not a monadic triad, but it is of all forms of dyadic triad that one which most closely apes the monadic triad. Had we enumerated the divisions of dyadic triads, we should have been obliged to put this first of all. One kind of event, at least, then, is a dyadic triad of the very first kind, distinguished from the monadic triad in that it would, from the essence of the monadic qualities involved, have been contrary to a logical law, were it a monadic triad.

493 There are other sorts of events, somewhat more complex because the characters concerned are not simple monadic qualities. For example, A may make war upon B, that is, may pass from one sort of relation to B to another sort of relation to B. But they come to much the same thing. There is a repugnance between two monad elements. It is hardly for our present purposes worth while to undertake a long analysis in order to make the very slight correction of our definition of an event called for on this account. An event always involves a junction of contradictory inferences in the subjects existentially the same, whether there is a simple monadic quality inhering in a single subject or whether they be inferences of contradictory monadic elements of dyads or polyads in several sets of subjects. But there is a more important possible way

ation in the nature of events. In the kind of events so far considered, while it is not necessary that the subjects should be existentially of the nature of subjects — that is, that they should be substantial things — since it may be a mere wave, or an optical focus, or something else of like nature which is the subject of change, yet it is necessary that these subjects should be in some measure permanent, that is, should be capable of accidental determinations, and therefore should have dyadic existence. But the event may, on the other hand, consist in the coming into existence of something that did not exist, or the reverse. There is still a contradiction here; but instead of consisting in the material, or purely monadic, repugnance of two qualities, it is an incompatibility between two forms of triadic relation, as we shall better understand later. In general, however, we may say that for an event there is requisite first, a contradiction; second, existential embodiments of these contradictory states; [third,] an immediate existential junction of these two contradictory existential embodiments or facts, so that the subjects are existentially identical; and fourth, in this existential junction a definite one of the two facts must be existentially first in the order of evolution and existentially second in the order of involution. We say the former is earlier, the latter later in time. That is, the past can in some measure work upon and influence (or flow into) the future, but the future cannot in the least work upon the past. On the other hand, the future can remember and know the past, but the past can only know the future so far as it can imagine the process by which the future is to be influenced.

494. Such, then, is the nature of an event. We can now go forward to an analysis of the substance of the law of time. It has three requirements, a monadic, a dyadic, and a triadic. The monadic clause in the law of time is that whatever fact or dyadic dyad exists, exists during a time, and in *this* time. The event is the existential junction of *states* (that is, of that which in existence corresponds to a *statement* about a given subject in representation) whose combination in one subject would violate the logical law of contradiction. The event, therefore, considered as a junction, is not a subject and does not inhere in a subject. What is it, then? Its mode of being is *existential quasi-existence*, or that approach to existence where

contraries can be united in one subject Time is that diversity of existence whereby that which is existentially a subject is enabled to receive contrary determinations in existence. Phillip is drunk and Phillip is sober would be absurd, did not time make the Phillip of this morning another Phillip than the Phillip of last night The law is that nothing dyadically exists as a subject without the diversification which permits it to receive contrary accidents The instantaneous Phillip who can be drunk and sober at once has a potential being which does not quite amount to existence

495 The dyadic requirement of the law of time is that if a subject existentially receives contrary attributes, of the two contrary states an existentially determinate one is first in the existential order of evolution and second in the existential order of involution, while the other is second in the existential order of evolution and first in the existential order of involution, and of any two events whatever, a determinate one is related to the other in this same way (although the two events are not joined, as the two states are joined in the event), unless they are independent of one another, or *contemporaneous*. Suppose I hold in my hand a leaden ball I open my hand, the ball falls to the ground and rests there There are three states of the ball. first, the ball is in my hand and is not on the ground, second, the ball is not in my hand and is not on the ground, third, the ball is not in my hand and is on the ground Of the two events, the ball's leaving my hand and the ball's striking the ground, the former consists in the junction of the ball's being in my hand as first in evolution and the ball's being out of my hand as second in evolution Hence, of the two states, the ball is in my hand but not on the ground and the ball is neither in my hand nor on the ground, the former is necessarily the first in evolution, being made so by the event And of the two states, the ball is neither in my hand nor on the ground and the ball is not in my hand but is on the ground the event of striking makes the former to be first in evolution Thus, the order of the states is controlled by the nature of the events But the events are nothing in themselves But if the fall were instantaneous, if for example my hand intercepted at first a visual ray and were then removed so that there were but two states — first, the hand visible the ground is visible,

second, the hand invisible, the ground visible — then the two events are contemporaneous. If the two states, first “P and Q,” second “not P and not Q” exist, then only one of the two states “P but not Q” and “Q but not P” can exist, for the reason that it is the dyadic character of the events that decides. Thus, supposing state “P and Q” and state “neither P nor Q” to both exist, and supposing that in the event “P – not P,” P is first in evolution, then the state “P and Q” must antecede the state “neither P nor Q” in evolution, and consequently in the event “Q – not Q,” Q must antecede not Q in evolution. These two events, “P becomes not P” and “Q becomes not Q,” may then either antecede the other in evolution, and according as one or other antecedes, one or other of the two states, “P but not Q,” and “not P but Q,” becomes impossible. If the two events are contemporaneous, neither being existentially determined to be first in evolution, then these two states are both impossible.

496. The three possible temporal relations between two instantaneous events are naturally felt by us to mirror the three possible logical relations of two propositions which can be both true or both false, but are not logically equivalent (that is, have not by logical necessity the same value, as to being true or false). Namely of two such propositions, A and B, either, first, A can be false though B is true, but B must be true should A be true, or, second, either can be false though the other be true, so that they are independent of one another, or, third, A must be true should B be true, but B can be false though A is true. It is remarkable that we should instinctively connect the first case with the temporal succession of B after A, and the third case with the temporal succession of A after B, saying, in the former case, that B would *follow* from A and, in the latter, that A would *follow* from B. For superficial resemblances are the other way. We know what precedes in time from that which succeeds it much better than we know what is to come from that which goes before. This shows the instinct is not due to superficial resemblances. It is true that we know the conclusion later than we know the premisses, but we do not so much think of our *knowledge* as following as we do that one *fact* is logically sequent on the other. The instinct may, therefore, be presumed to be an obscure perception that temporal succession is a mirror of, or framework for, logical

sequence. Thus instinct with its almost unerring certainty favors this doctrine.

497 That of two events not contemporaneous one should happen before the other involves a *thisness* and thus a dyadism. For as it is impossible for us to indicate or ascertain one to be first by any general quality but only by a comparison with some standard experience, so it is impossible for a distinction of first and second to be except by a dyadic force of existence. That a determinate one shall be first and the other second requires reference to some kind of standard, since right and left are, as far as any monadic quality goes, just alike. There must be a standard first and second, and for any other pair there must be some way of bringing them into experiential connection one way and not the other way with this standard. This experiential reference to a standard in knowledge corresponds to an existential dyadic connection in fact. Otherwise there would be no truth in the knowledge.

498 So much for the dyadic clause of the law of time. The triadic clause is that time has no limit, and every portion of time is bounded by two instants which are of it, and between any two instants either way round, instants may be interposed such that taking any possible multitude of objects there is at least one interposed event for every unit of that multitude. This statement needs some explanation of its meaning. First what does it mean to say that time has no limit? This may be understood in a topical or a metrical sense. In a metrical sense it means there is no absolutely first and last of time. That is, while we must *adopt* a standard of first and last, there is nothing in its own nature the prototype of first and last. For were there any such prototype, that would consist of a pair of objects absolutely first and last. This however, is more than is intended here. Whether that be true or not is a question concerning rather the events in time than time itself. What is here meant is that time has no instant from which there are more or less than two ways in which time is stretched out, whether they always be in their nature the foregoing and the coming after, or not. If that be so since every portion of time is bounded by two instants there must be a connection of time ring-wise. Events may be limited to a portion of this ring, but the time itself must extend round or else there is a beginning.

a portion of time, say future time and also past time, not bounded by two instants. The justification of this view is that it extends the properties we see belong to time to the whole of time without arbitrary exceptions not warranted by experience. Now, between any two events may be interposed not merely one event but a multitude of events greater than that statement would supply, a multitude of events as great as a multitude of objects describable. This may be really so or not, but this is the instinctive law of which we seem to be directly conscious.

499. By virtue of this, time is a continuum. For since the instants, or possible events, are as many as any collection whatever, and there is no maximum collection, it follows that they are more than any collections whatever. They must, therefore, be individually indistinguishable in their very existence — that is, are distinguishable and the parts distinguishable indefinitely, but yet not composed of individuals absolutely self-identical and distinct from one another — that is, they form a *continuum*. A continuum cannot be disarranged except to an insignificant extent. An instant cannot be removed. You can no more, by any decree, shorten a legal holiday by transferring its last instant to the work-day that follows that feast, than you can take away intensity from light, and keep the intensity on exhibition while the light is thrown into the ash-barrel. A limited line AB may be cut into two, AC and C'B, and its ends joined, C' to A and C to B. That is to say, all this may be done in the imagination. We have a difficulty in imagining such a thing in regard to time. For in order that the time should flow continuously even in imagination from the end of one day into the beginning of a day that does historically come next, all the events must be prepared so that the states of things of these two instants, including states of gradual change, such as velocity, etc., shall be precisely the same. In the case of a line we do not think of this, although it is equally true, because we are unaccustomed to minutely dealing with the facts about single molecules and atoms upon which the cohesion of matter depends. We, therefore, see no particular difficulty in joining any end of a line to any other line's end continuously. This is as true a view as the other. As far as time itself goes, nothing prevents twenty-four hours being cut

out and the day before joining continuously to the day after, were there any power that could affect such a result. In such a case, the two instants brought together would be *identified*, or made one, which sufficiently shows their want of individual *self-identity* and repugnance to all others.

500. Intimately connected with the division of metaphysically contingent laws into laws which impose, upon inferences of different attributes in the same subject, forms analogous to forms of thought so that they may evade laws of logic and into those laws which have no reference to thought, there is a division of these latter laws into laws which impose, upon different subjects of precisely the same qualities, forms of relationship analogous to metaphysical forms so that they may evade the laws of metaphysics, that is, laws of space, and into laws which do not concern dyads of inherence but only dyads of reaction.

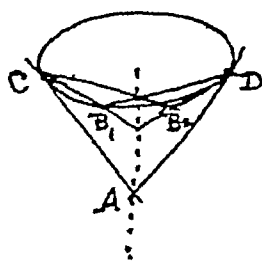
501. According to the metaphysical law of sufficient reason, alike in all respects two things cannot be. Space evades that law by providing places in which two things or any number, which are precisely alike, except that they are located in different places, themselves precisely alike in themselves, may exist. Thus, space does for different subjects of one predicate precisely what time does for different predicates of the same subject. And as time effects its evasion of the logical law by providing a form analogous to a logical form, so space effects its evasion of the metaphysical law by providing a form analogous to a metaphysical form. Namely, as metaphysics teaches that there is a succession of realities of higher and higher order, each a generalization of the last, and each the limit of a reality of the next higher order, so space presents points, lines, surfaces, and solids, each generated by the motion of a place of next lower dimensionality and the limit of a place of next higher dimensionality.

502. The last division of laws was a broad one. Now *a posteriori* laws are divided into those which are purely dynamical and those which are more or less intellectual, a division somewhat analogous to that of mental association into association by contiguity and by resemblance. The former are the nomological laws of physics. So far as our present knowledge of them, they are as follows.

503. First, every particle, or mathematically indivisible portion of matter, when not under a force, moves along a *ray*, or line belonging to a certain family of lines such that any four of them not all cut by each of an infinite multitude of rays is cut by just two rays.

504. Second, there is a *firmament*, or surface, severing space into worlds, and its properties are, first, that if (A), (B), (C), (D), (E), (F), are any points in a plane¹ section of it, the rays $\{AB\}$ and $\{DE\}$ will meet at a point $[\{AB\}\{DE\}]$ which is coradial with $[\{BC\}\{EF\}]$ and $[\{CD\}\{FA\}]$, secondly, no material particle ever comes to or leaves the firmament, nor does any plane fixedly connected with a particle ever move into or away from tangency with the firmament; and thirdly, if a body is *rigid*, that is, has only six degrees of freedom, so that all its radiform filaments are fixed when six of its particles are restricted to lying in fixed planes, or when six of its plane films are restricted to passing through fixed points, then, all its possible displacements are subject to the following conditions:

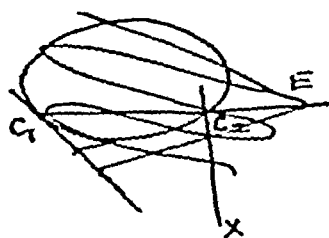
First, if two particles, A and B, of the rigid solid be situated in points $[A_1]$ and $[B_1]$ such that the ray $\{A_1 B_1\}$ has two points in the firmament, say $[C_1]$ and $[D_1]$, then A and B, however displaced, must lie in a ray that has two points in the firmament, and if any ray through $[A_1]$ has the two points $[C_2]$ and



$[D_2]$ in the firmament, then A remaining fixed in $[A_1]$, B can be displaced so as to occupy the point $[\{[\{C_1 C_2\}\{D_1 D_2\}]\} B_1]\{C_2 D_2\}]$ or the point $[\{[\{C_1 D_2\}\{C_2 D_1\}]\} B_1]\{C_2 D_2\}]$; but A and B can occupy simultaneously no pair of points which they are not necessarily able to occupy by virtue of this statement.

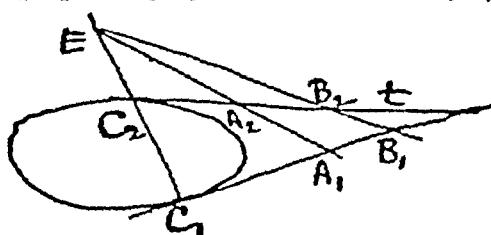
¹ A plane being the surface generated by a ray restricted to cutting two fixed rays which cut one another.

Second, if two particles, A and B, of the rigid solid are situated at points $[A_1]$ and $[B_1]$ such that the ray $\{A_1B_1\}$ has no point in the firmament, [then] in any plane containing $[A_1]$ and $[B_1]$ let $[C]$ and $[D]$ be the points of tangency of rays tangent to the firmament and passing through $[A_1]$. Then through



$[A_1]$ take any ray $\{r\}$ whatever, then $\{[\{CB_1\}r]D\} \{[\{DB_1\}r]C\}$ will be a point where the particle B may be while A is at $[A_1]$.

Third, if two particles, A and B, of the rigid solid are situated at points $[A_1]$ and $[B_1]$ such that the ray $\{A_1B_1\}$ has one



point in the firmament $[C_1]$, [then] in any plane through $\{A_1B_1\}$ take any other point $[C_2]$ on the firmament, and take any point $[E]$ on the ray, $\{C_1C_2\}$. Then, if $\{t\}$ is the ray tangent to the firmament at $[C_2]$, A and B may be simultaneously at $[t\{EA_1\}]$ and $[t\{EB_1\}]$.

Every radial filament of a rigid body (supposed to fill all space) has its polar conjugate radial filament. Namely, one of these rays is the intersection of two planes tangent to the firmament, while the other passes through the two points of tangency. Every infinitesimal displacement of a rigid body is as if it were a part of a rigid body filling all space, and having two motions in one of which all the particles in one ray are fixed while all the plane films through its polar conjugate remain in the same plane, while in the other motion the reverse is the case.

505. Third, the effect of force upon a particle is to produce, while that force lasts, a component acceleration of the particle proportional to and in the ray of the force, and the resultant of such component accelerations is the same as if in each infinitesimal time, the different components acted successively, but each for a time equal to the whole of the infinitesimal time.

506 Fourth, the effect of a force between two particles is to give them opposite accelerations along the ray through them, these accelerations being inversely as certain quantities, called the *masses* of the accelerated particles, which masses are constant throughout all time.

507. Fifth, so far as force acts between pairs of particles regarded as mere occupiers of points, it depends upon the relative positions of the particles.

508. Sixth, it remains at present uncertain how the phenomena of elasticity, etc. are to be accounted for, but it is certain that all force cannot be positional attractions and repulsions. There is therefore some law additional to the last.

509. Seventh, all particles at a greater distance than a decimetre from one another attract one another nearly inversely as the square of the distance, the constant modulus being 6.658×10^{-5} (Boys) *

510 Eighth, particles closer together are known to attract one another more strongly, and it seems probable, although it is far from proved, that there are at least two kinds of particles attracting one another differently, but here our ignorance begins to be almost complete.

511. Laws which connect phenomena by a synthesis more or less intellectual, or inward, are divided somewhat broadly into laws of the inward relations, or resemblances, of bodies, and laws of mind.

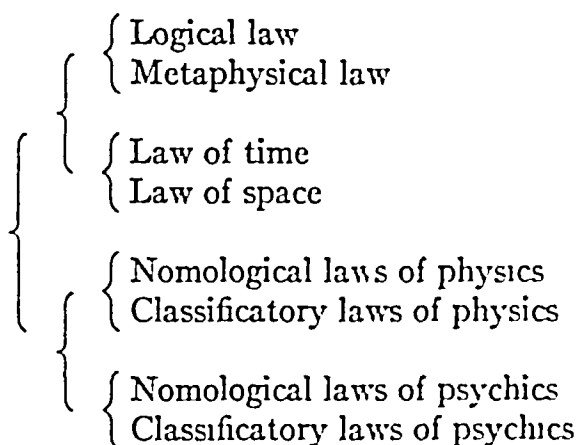
512 The laws of resemblances and differences of bodies are classificatory, or chemical. We know little about them; but we may assert with some confidence that there are differences between substances — *i.e.*, differences in the smallest parts of bodies, and a classification based on that, and there are differences in the structure of bodies, and a classification based on that. Then of these latter we may distinguish dif-

* See "On the Newtonian Constant of Gravitation," *Philosophical Transactions*, London, 1895, 186A, p. 69.

ferences in the structure of the smallest pieces of bodies, depending on the shape and size of atomcules, and differences in the manner in which bodies are built up out of their smallest pieces. Here we have a distinction between that kind of structure which gives rise to forms without power of truth [true?] growth or inorganic structures, and the chemistry of protoplasms which develop [or] living organisms

513. Finally laws of mind divide themselves into laws of the universal action of mind and laws of kinds of psychical manifestation.

514 Thus the general scheme of the division of laws is as follows



515. We now come to thoroughly genuine triads, the third class of the third class of triads, and at this stage of the inquiry it is well that we should take our bearings and note just where we are, in order that we may lay out our course for the next advances in the discussion. The monad has no features but its suchness, which appears in logic — let us remember that logic must be our guide throughout — as the signification of the verb. This already receives embodiment in the lowest of the chief forms of logic, the *term*. The dyad introduced a radically different sort of element, the subject, which first shows itself in the *proposition*. The dyadic proposition has two subjects, each a sort of mimic monad, but the two [are] of different kinds, one being active, the other passive. The triad brings a third sort of element, the expression of thought, or reasoning, consisting of a colligation of two propositions, not mere dyadic propositions, however, but general beliefs, and then two

propositions are connected by a common term and tend to produce a third belief. They not only tend to make the belief, but they also tend to render it true. This reason first emerges in the syllogism, which has three such colligations of premisses. Take the stock example,

All men die,
 Enoch is a man,
 Therefore, Enoch dies

These propositions are not dyadic. The first is not so, because it is a rule, not a mere individual fact, the second is not so, because its second term is not a mere monadic quality, still less an individual unit, it is a class-term. The third is not so, because it is thought as a *result*. Each pair of these three propositions is a reason tending to render the third true. The first and third do so by means of their common monadic character. The first gives *dying* as a specimen character of all men, now the third declares as a consequence that Enoch dies. This gives Enoch one character of men, and so far as Enoch's dying is a consequence goes toward making him a man. The second and third propositions tend to make the first true by means of their common dyadic subject. The second proposition declares Enoch to be a specimen of a man. The third declares as a consequence that Enoch dies. This makes one man die, and so far as Enoch's dying is a consequence tends to render it true that *all men die*. Finally, the first two propositions bring about the truth of the third. In this particular case they do so absolutely. They generally tend to do so in a way which ought not to be more convincing, but is more in the way in which the objective truth is conceived to result than the other two. They do so by means of their community with respect to the middle term man, a term which as combining the characters of subject and predicate has a triadic element. For combination is triadism, and triadism is combination. Just as the logical verb^o with its signification reappears in metaphysics as a quality, an *ens* having a *nature* as its mode of being, and as a logical individual subject reappears in metaphysics as a thing, an *ens* having *existence* as its mode of being, so the logical reason, or premiss, reappears in metaphysics as a reason, an *ens* having a *reality*, consisting in a ruling both of the outward and of the

inward world, as its mode of being. The being of the quality lies wholly in itself, the being of the thing lies in opposition to other things, the being of the reason lies in its bringing qualities and things together.

516 In the degenerate dyad there is a metaphysical correspondent to a proposition, but it is a proposition whose two subjects are mere qualities. In the first degenerate triad there is a metaphysical correspondent to a syllogism, but it is a syllogism whose three reasons lie in mere qualities. Thus, orange color is intermediate between red and yellow. The syllogism is this

Orange has in its own nature a certain
indescribable but felt relation to red,

Yellow has a similar relation to orange,

as a result, Yellow has a similar relation to red

Now, if yellow has a relation to orange and as a result yellow has the same relation to red, this can only be because orange has that same relation to red.

517 In the second degenerate triad there is likewise a metaphysical correspondent to a syllogism, but it is a syllogism whose premisses lie in mere coexistences of dyadic facts. For example

A is the mother of B,

B is the wife of C,

it results that A is the mother-in-law of C

In the genuine triad, however, there is a real law, and a real case under the law, so that the reasons are not merely reasons in form, but they really govern the truth.

518 But though there be a real operation of law, yet one of the three reasons may be wanting in triadic reality

All colors are compounds of so much red,
green, and blue,

Yellow is a color,

as a result, Yellow is compounded of proportions of
red, green, and blue

The middle term here is little more than a conjunction of qualities differing from that only in the separate color of

being explicitly thought. Accordingly, that colors are compounded and that yellow is as a result so compounded only in form goes to make yellow a color; for in the very essence of color it is already given that yellow is a color. This triad is, therefore, only two-thirds genuine, one of its three reasons not being really operative.

519 A somewhat similar case arises when the middle term is a mere generalized dyadic existence.

All bodies are attracted toward one another
proportionally to their masses and inversely
as the square of the distance, multiplied by
a fixed modulus.

The earth and moon have such and such masses
and are at such a distance,
as a result, The earth and moon attract one another by so
much.

But the last two propositions can hardly be said really to go toward making the truth of the first, since that law is nothing but the expression of the way bodies do move as facts. As far as it concerns the earth and moon it is so in the fact itself, and the earth and moon having such masses and distance as they have does not affect the brute fact, but only makes a certain proposition express that fact.

520 But there is a third kind of genuine triad in regard to which neither of the qualifications of their thorough genuineness applies for the reason that the result is of such a nature that it could not subsist were it not for the middle term which sustains it. A gives B to C. Say he does this by a formal legal act. Then, in this act A deprives himself of B, he also enters into an engagement with C and by virtue of these two sides of the act of gift, and of their unity, C acquires possession of B. But this is a remote result. The immediate result is that he acquires possession of B by the gift of A and without the action of A he could not acquire that possession.

CHAPTER 5

'DEGENERATE CASES'

§1. KINDS OF SECONDNESS

521. Very wretched is the notion of [the categories] that can be conveyed in one lecture. They must grow up in the mind, under the hot sunshine of hard thought, daily, bright, well-focussed, and well-aimed thought, and you must have patience, for long time is required to ripen the fruit. They are no inventions of mine. Were they so, that would be sufficient to condemn them. Confused notions of these elements appear in the first infancy of philosophy, and they have never entirely been forgotten. Their fundamental importance is noticed in the beginning of Aristotle's *De Caelo*, where it is said† that the Pythagoreans knew of them.

522. In Kant they come out with an approach to lucidity. For Kant possessed in a high degree all seven of the mental qualifications of a philosopher

1. The ability to discern what is before one's consciousness
2. Inventive originality.
3. Generalizing power
4. Subtlety.
5. Critical severity and sense of fact
6. Systematic procedure
7. Energy, diligence, persistency, and exclusive devotion to philosophy

523. But Kant had not the slightest suspicion of the inexhaustible intricacy of the fabric of conceptions, which is such that I do not flatter myself that I have ever analyzed a single idea into its constituent elements.

524. Hegel, in some respects the greatest philosopher that ever lived, had a somewhat juster notion of this complication.

* From the "Lowell Lectures of 1828," Lecture III, § 1, 2, 3. *Deutsche Literatur* 349

† 268a 11

though an inadequate notion, too. For if he had seen what the state of the case was, he would not have attempted in one lifetime to cover the vast field that he attempted to clear. But Hegel was lamentably deficient in that fifth requisite of critical severity and sense of fact. He brought out the three elements much more clearly [than Kant did], but the element of Secondness, of *hard fact*, is not accorded its due place in his system; and in a lesser degree the same is true of Firstness. After Hegel wrote, there came fifty years that were remarkably fruitful in all the means for attaining that fifth requisite. Yet Hegel's followers, instead of going to work to reform their master's system, and to render his statement of it obsolete, as every true philosopher must desire that his disciples should do, only proposed, at best, some superficial changes without replacing at all the rotten material with which the system was built up.

525. I shall not inflict upon you any account of my own labors. Suffice it to say that my results have afforded me great aid in the study of logic.

I will, however, make a few remarks on these categories. By way of preface, I must explain that in saying that the three, Firstness, Secondness, and Thirdness, complete the list, I by no means deny that there are other categories. On the contrary, at every step of every analysis, conceptions are met with which presumably do not belong to this series of ideas. Nor did an investigation of them occupying me for two years reveal any analysis of them into these as their constituents. I shall say nothing further about them, except incidentally.

526. As to the three universal categories, as I call them, perhaps with no very good reason for thinking that they are more universal than the others, we first notice that Secondness and Thirdness are conceptions of complexity. That is not, however, to say that they are complex conceptions. When we think of Secondness, we naturally think of two reacting objects, a first and a second. And along with these, as subjects, there is their reaction. But these are not constituents out of which the Secondness is built up. The truth is just reverse, [in] that the being a first or a second or the being a reaction each involves Secondness. An object cannot be a *second* of itself. If it is a second, it has an element of being what another makes

it to be. That is, the being a second involves Secondness. The reaction still more manifestly involves the being what another makes a subject to be. Thus, while Secondness is a fact of complexity, it is not a compound of two facts. It is a single fact about two objects. Similar remarks apply to Thirdness.

527 This remark at once leads to another. The Secondness of the second, whichever of the two objects be called the second, is different from the Secondness of the first. That is to say it *generally* is so. To kill and to be killed are different. In case there is one of the two which there is good reason for calling the first, while the other remains the second, it is that the Secondness is more accidental to the former than to the latter, that there is more or less approach to a state of things in which something, which is itself first, accidentally comes into a Secondness that does not really modify its Firstness, while its second in this Secondness is something whose *being* is of the nature of Secondness and which has no Firstness separate from this. It must be extremely difficult for those who are untrained to such analyses of conceptions to make any sense of all this. For that reason, I shall inflict very little of it upon you — just enough to show those who *can* carry what I say in their minds that it is by no means nonsense. The extreme kind of Secondness which I have just described is the relation of a *quality* to the *matter* in which that quality inheres. The mode of being of the quality is that of Firstness. That is to say, it is a possibility. It is related to the matter accidentally, and this relation does not change the quality at all, except that it imparts *existence*, that is to say, this very relation of inherence, to it. But the *matter*, on the other hand, has no being at all except the being a subject of qualities. This relation of really having qualities constitutes its *existence*. But if all its qualities were to be taken away, and it were to be left quality-less matter, it not only would not exist but it would not have any positive definite possibility — such as an unembodied quality has. It would be nothing at all.

528 Thus we have a division of seconds into those whose very being, or Firstness, it is to be seconds, and those whose Secondness is only an accretion. This distinction springs out of the essential elements of Secondness. For Secondness involves Firstness. The concepts of the two kinds of seconds are

ness are mixed concepts composed of Secondness and Firstness. One is the second whose very Firstness is Secondness. The other is a second whose Secondness is second to a Firstness. The idea of mingling Firstness and Secondness in this particular way is an idea distinct from the ideas of Firstness and Secondness that it combines. It appears to be a conception of an entirely different series of categories. At the same time, it is an idea of which Firstness, Secondness, and Thirdness are component parts, since the distinction depends on whether the two elements of Firstness and Secondness that are united are so united as to be one or whether they remain two. This distinction between two kinds of seconds, which is almost involved in the very idea of a second, makes a distinction between two kinds of Secondness; namely, the Secondness of genuine seconds, or matters, which I call genuine Secondness, and the Secondness in which one of the seconds is only a Firstness, which I call degenerate Secondness; so that this Secondness really amounts to nothing but this, that a subject, in its being a second, has a Firstness, or quality. It is to be remarked that this distinction arose from attending to extreme cases; and consequently subdivision will be attached to it according to the more or less essential or accidental nature of the genuine or the degenerate Secondness. With this distinction Thirdness has nothing to do, or at any rate has so little to do that a satisfactory account of the distinction need not mention Thirdness.

529 I will just mention that among Firstnesses there is no distinction of the genuine and the degenerate, while among Thirdnesses we find not only a genuine but two distinct grades of degeneracy.

§2. THE FIRSTNESS OF FIRSTNESS, SECONDNESS, AND THIRDNESS

530 But now I wish to call your attention to a kind of distinction which affects Firstness more than it does Secondness, and Secondness more than it does Thirdness. This distinction arises from the circumstance that where you have a triplet you have three pairs; and where you have a pair, you have two units. Thus, Secondness is an essential part of

Thirddness though not of Firstness, and Firstness is an essential element of both Secondness and Thirddness. Hence there is such a thing as the Firstness of Secondness and such a thing as the Firstness of Thirddness, and there is such a thing as the Secondness of Thirddness. But there is no Secondness of pure Firstness and no Thirddness of pure Firstness or Secondness. When you strive to get the purest conceptions you can of Firstness, Secondness, and Thirddness, thinking of quality, reaction, and mediation — what you are striving to apprehend is pure Firstness, the Firstness of Secondness — that is what Secondness is, of itself — and the Firstness of Thirddness. When you contrast the blind compulsion in an event of reaction considered as something which happens and which of its nature can never happen again, since you cannot cross the same river twice, when, I say, you contrast this compulsion with the logical necessitation of a *meaning* considered as something that has no being at all except so far as it actually gets embodied in an event of thought, and you regard this logical necessitation as a sort of actual compulsion, since the meaning must actually be embodied, what you are thinking of is a Secondness involved in Thirddness.

531. A Firstness is exemplified in every quality of a total feeling. It is perfectly simple and without parts, and everything has its quality. Thus the tragedy of King Lear has its Firstness, its flavor *sui generis*. That wherein all such qualities agree is universal Firstness, the very being of Firstness. The word *possibility* fits it, except that possibility implies a relation to what exists, while universal Firstness is the mode of being of itself. That is why a new word was required for it. Otherwise, "possibility" would have answered the purpose.

532. As to Secondness, I have said that our only direct-knowledge of it is in willing and in the experience of a perception. It is in willing that the Secondness comes out most strongly. But it is not pure Secondness. For, in the first place, he who wills has a purpose, and that idea of purpose makes the act appear as a *means* to an end. Now the word *means* is almost an exact synonym to the word *third*. It certainly involves Thirddness. Moreover, he who wills is conscious of doing so, in the sense of *representing* to himself that he does so. But representation is precisely genuine Thirddness. You must

conceive an instantaneous consciousness that is instantly and totally forgotten and an effort without purpose. It is a hopeless undertaking to try to realize what consciousness would be without the element of representation. It would be like unexpectedly hearing a great explosion of nitroglycerine before one had recovered oneself and merely had the sense of the breaking off of the quiet. Perhaps it might not be far from what ordinary common sense conceives to take place when one billiard ball caroms on another. One ball "acts" on the other; that is, it makes an exertion *minus* the element of representation. We may say with some approach to accuracy that the general Firstness of all true Secondness is *existence*, though this term more particularly applies to Secondness in so far as it is an element of the reacting first and second. If we mean Secondness as it is an element of the occurrence, the Firstness of it is *actuality*. But actuality and existence are words expressing the same idea in different applications. Secondness, strictly speaking, is just when and where it takes place, and has no other being, and therefore different Secondnesses, strictly speaking, have in themselves no quality in common. Accordingly, existence, or the universal Firstness of all Secondness, is really not a quality at all. An actual dollar to your credit in the bank does not differ in any respect from a possible imaginary dollar. For if it did, the imaginary dollar could be imagined to be changed in that respect, so as to agree with the actual dollar. - We thus see that actuality is not a *quality*, or mere mode of feeling. Hence Hegel, whose neglect of Secondness was due chiefly to his not recognizing any other mode of being than existence — and what he calls *existenz* is a special variety of it merely — regarded pure being as pretty much the same as nothing. It is true that the word "existence" names, as if it were an abstract possibility, that which is precisely the not having any being in abstract possibility, and this circumstance, when you look upon existence as the only being, seems to make existence all but the same as nothing.

533. To express the Firstness of Thirdness, the peculiar flavor or color of mediation, we have no really good word. *Mentality* is, perhaps, as good as any, poor and inadequate as it is. Here, then, are three kinds of Firstness, qualitative possibility, existence, mentality, resulting from applying Firstness

to the three categories. We might strike new words for them: primity, secundity, tertiality.

534. There are also three other kinds of Firstness which arise in a somewhat similar way, namely, the idea of a simple original quality, the idea of a quality essentially relative, such as that of being "an inch long", and the idea of a quality that consists in the way something is thought or represented, such as the quality of being manifest.

535 I shall not enter into any exact analysis of these ideas I only wished to give you such slight glimpse as I could of the sort of questions that busy the student of phenomenology, merely to lead up to Thirdness and to the particular kind and aspect of Thirdness which is the sole object of logical study. I want first to show you what genuine Thirdness is and what are its two degenerate forms. Now we found the genuine and degenerate forms of Secondness by considering the full ideas of first and second. Then the genuine Secondness was found to be reaction, where first and second are both true seconds and the Secondness is something distinct from them, while in degenerate Secondness, or mere reference, the first is a mere first never attaining full Secondness.

536 Let us proceed in the same way with Thirdness. We have here a first, a second, and a third. The first is a positive qualitative possibility, in itself nothing more. The second is an existent thing without any mode of being less than existence, but determined by that first. A *third* has a mode of being which consists in the Secondnesses that it determines, the mode of being of a law, or concept. Do not confound this with the ideal being of a quality in itself. A quality is something capable of being completely embodied. A law never can be embodied in its character as a law except by determining a habit. A quality is how something may or might have been. A law is how an endless future must continue to be.

537 Now in genuine Thirdness, the first, the second, and the third are all three of the nature of thirds, or thought, while in respect to one another they are first, second, and third. The first is thought in its capacity as mere possibility, that is, mere *mind* capable of thinking, or a mere vague idea. The second is thought playing the role of a Secondness or event. That is, it is of the general nature of *experience* or *information*.

The third is thought in its role as governing Secondness. It brings the information into the mind, or determines the idea and gives it body. It is informing thought, or *cognition*. But take away the psychological or accidental human element, and in this genuine Thirdness we see the operation of a sign.

538. Every sign stands for an object independent of itself, but it can only be a sign of that object in so far as that object is - itself of the nature of a sign or thought. For the sign does not affect the object but is affected by it; so that the object must be able to convey thought, that is, must be of the nature of thought or of a sign. Every thought is a sign. But in the first degree of degeneracy the Thirdness affects the object, so that this is not of the nature of a Thirdness — not so, at least, as far as this operation of degenerate Thirdness is concerned. It is that the third brings about a Secondness but does not regard that Secondness as anything more than a fact. In short it is the operation of executing an *intention*. In the last degree of degeneracy of Thirdness, there is thought, but no conveyance or embodiment of thought at all. It is merely that a fact of which there must be, I suppose, something like knowledge is *apprehended* according to a possible idea. There is an *instigation* without any *prompting*. For example, you look at something and say, "It is red." Well, I ask you what justification you have for such a judgment. You reply, "I *saw* it was red." Not at all. You saw nothing in the least like that. You saw an image. There was no subject or predicate in it. It was just one unseparated image, not resembling a proposition in the smallest particular. It instigated you to your judgment, owing to a possibility of thought; but it never told you so. Now in all imagination and perception there is such an operation by which thought springs up, and its only justification is that it subsequently turns out to be useful.

539. Now it may be that *logic* ought to be the science of Thirdness in general. But as I have studied it, it is simply the science of what must be and ought to be true representation, so far as representation can be known without any gathering of special facts beyond our ordinary daily life. It is, in short, the philosophy of representation.

540. The analysis which I have just used to give you some notion of genuine Thirdness and its two forms of degeneracy

is the merest rough blackboard sketch of the true state of things; and I must begin the examination of representation by defining representation a *little* more accurately. In the first place, as to my terminology, I confine the word *representation* to the operation of a sign or its *relation to the object for the interpreter of the representation*. The concrete subject that represents I call a *sign* or a *representamen*. I use these two words, *sign* and *representamen*, differently. By a *sign* I mean anything which conveys any definite notion of an object in any way, as such conveyers of thought are familiarly known to us. Now I start with this familiar idea and make the best analysis I can of what is essential to a sign, and I define a *representamen* as being whatever that analysis applies to. If therefore I have committed an error in my analysis, part of what I say about *signs* will be false. For in that case a *sign* may not be a *representamen*. The analysis is certainly true of the *representamen*, since that is all that word means. Even if my analysis is correct, something may happen to be true of all *signs*, that is of everything that, antecedently to any analysis, we should be willing to regard as conveying a notion of anything, while there might be something which my analysis describes of which the same thing is not true. In particular, all signs convey notions to *human minds*, but I know no reason why every *representamen* should do so.

541. My definition of a *representamen* is as follows:

A REPRESENTAMEN is a subject of a triadic relation TO a second, called its OBJECT, FOR a third, called its INTERPRETANT, this triadic relation being such that the REPRESENTAMEN determines its interpretant to stand in the same triadic relation to the same object for some interpretant

542. It follows at once that this relation cannot consist in any actual event that ever can have occurred, for in that case there would be another actual event connecting the interpretant to an interpretant of its own of which the same would be true; and thus there would be an endless series of events which could have actually occurred, which is absurd. For the same reason the interpretant cannot be a *definite* individual object. The relation must therefore consist in a *power* of the *representamen* to determine *some* interpretant to being a *representamen* of the same object.

543 Here we make a new distinction. You see the principle of our procedure. We begin by asking what is the mode of being of the subject of inquiry, that is, what is its absolute and most universal Firstness? The answer comes, that it is either the Firstness of Firstness, the Firstness of Secondness, or the Firstness of Thirdness.

We then ask what is the universal Secondness, and what the universal Thirdness, of the subject in hand.

Next we say that Firstness of Firstness, that Firstness of Secondness and that Firstness of Thirdness, that have been described, have been the Firstness of the Firstness in each case. But what is the Secondness that is involved in it and what is the Thirdness?

So the Secondnesses as they have been first given are the Firstnesses of those Secondnesses. We ask what Secondness they involve and what Thirdness. And so we have endless questions, of which I have only given you small scraps.

The answers to these questions do not come of themselves. They require the most laborious study, the most careful and exact examination. The system of questions does not save that trouble in the least degree. It enormously increases it by multiplying the questions that are suggested. But it forces us along step by step to much clearer conceptions of the objects of logic than have ever been attained before. The *hard fact* that it has yielded such fruit is the principal argument in its favor.

544 The method has a general similarity to Hegel's. It would be historically false to call it a modification of Hegel's. It was brought into being by the study of Kant's categories and not Hegel's. Hegel's method has the defect of not working at all if you think with too great exactitude. Moreover, it presents no such definite question to the mind as this method does. This method works better the finer and more accurate the thought. The subtlest mind cannot get the best possible results from it; but a mind of very moderate skill can make better analyses by this method than the same mind could obtain without it, by far.

-Analyses apparently conflicting may be obtained by this method by different minds, owing to the impossibility of conforming strictly to the requirements. But it does not follow that the results are utterly wrong. They will be two imperfect analyses, each getting a part of the truth.

CHAPTER 6

ON A NEW LIST OF CATEGORIES

§1. ORIGINAL STATEMENT^E

545 This paper is based upon the theory already established, that the function of conceptions is to reduce the manifold of sensuous impressions to unity and that the validity of a conception consists in the impossibility of reducing the content of consciousness to unity without the introduction of it.

546 This theory gives rise to a conception of gradation among those conceptions which are universal. For one such conception may unite the manifold of sense and yet another may be required to unite the conception and the manifold to which it is applied, and so on.

547. That universal conception which is nearest to sense is that of *the present, in general*. This is a conception, because it is universal. But as the act of *attention* has no connotation at all, but is the pure denotative power of the mind, that is to say, the power which directs the mind to an object, in contradistinction to the power of thinking any predicate of that object — so the conception of *what is present in general*, which is nothing but the general recognition of what is contained in attention, has no connotation, and therefore no proper unity. This conception of the present in general, of IT in general, is rendered in philosophical language by the word “substance” in one of its meanings. Before any comparison or discrimination can be made between what is present, what is present must have been recognized as such as *it*, and subsequently the metaphysical parts which are recognized by abstraction are attributed to this *it*, but the *it* cannot itself be made a predicate. This *it* is thus neither predicated of a

* The first section of this chapter was published with the chapter before in the *Proceedings of the American Academy of Arts and Sciences*, vol. 7, May, 1877, pp. 287-298. It was intended as ch. 1 of the *Grand Logic* of 1879 or 1882. Essay II of the *Search for a Method* of c. 1873.

subject, nor in a subject, and accordingly is identical with the conception of substance.

548 The unity to which the understanding reduces impressions is the unity of a proposition. This unity consists in the connection of the predicate with the subject; and, therefore, that which is implied in the copula, or the conception of *being*, is that which completes the work of conceptions of reducing the manifold to unity. The copula (or rather the verb which is copula in one of its senses) means either *actually is* or *would be*, as in the two propositions, "There *is* no griffin," and "A griffin *is* a winged quadruped." The conception of *being* contains only that junction of predicate to subject wherein these two verbs agree. The conception of being, therefore, plainly has no content.

If we say "The stove is black," the stove is the *substance*, from which its blackness has not been differentiated, and the *is*, while it leaves the substance just as it was seen, explains its confusedness, by the application to it of *blackness* as a predicate.

Though *being* does not affect the subject, it implies an indefinite determinability of the predicate. For if one could know the copula and predicate of any proposition, as ". . . . is a tailed-man," he would know the predicate to be applicable to something supposable, at least. Accordingly, we have propositions whose subjects are entirely indefinite, as "There is a beautiful ellipse," where the subject is merely *something actual or potential*; but we have no propositions whose predicate is entirely indeterminate, for it would be quite senseless to say, "A has the common characters of all things," inasmuch as there are no such common characters.

Thus substance and being are the beginning and end of all conception. Substance is inapplicable to a predicate, and being is equally so to a subject.

549. The terms "precision"¹ and "abstraction," which

¹ *Precision* (1) A high degree of approximation, only attainable by the thorough application of the most refined methods of science.

(2) Its earlier meaning, still more or less used by logicians, is derived from a meaning given to *praecisio* by Scotus and other scholastics: the act of supposing (whether with consciousness of fiction or not) something about one element of a percept, upon which the thought dwells, without paying any regard to other elements. Precision implies more than mere discrimination, which

were formerly applied to every kind of separation, are now limited, not merely to mental separation, but to that which arises from *attention to one element and neglect of the other*. Exclusive attention consists in a definite conception or *supposition* of one part of an object, without any supposition of the other. Abstraction or precision ought to be carefully distinguished from two other modes of mental separation, which may be termed *discrimination* and *dissociation*. Discrimination has to do merely with the senses of terms, and only draws a distinction in meaning. Dissociation is that separation which, relates merely to the essence of a term. Thus I can, by an act of discrimination, separate color from extension, but I cannot do so by *precision*, since I cannot suppose that in any possible universe color (not color-sensation, but color as a quality of an object) exists without extension. So with *triangularity* and *trilaterality*. On the other hand, precision implies much less than dissociation, which, indeed, is not a term of logic, but of psychology. It is doubtful whether a person who is not devoid of the sense of sight can separate space from color by dissociation, or, at any rate, not without great difficulty, but he can, and, indeed, does do so, by *precision*, if he thinks a vacuum is uncolored. So it is, likewise, with space and tridimensionality.

Some writers called every description of abstraction by the name *precision*, dividing precision into the real and the mental, and the latter into the negative and the positive, but the better usage named these *abstraction* divided into *real* and *intentional*, and the latter into *negative* (in which character from which abstraction is made is imagined to be *deivable* of the subject prescindend) and into *precursive abstraction* or *precision*, where the subject prescindend is supposed (in some hypothetical state of things) without any supposition, whether affirmative or negative, in respect to the character abstracted. Hence, the *brevard abstractentium non est mendacium* (generally enunciated in connection with the *De Anima*, III, VII, 7). Scotus (in II *Physic*, *Expositio* 20 *textus* 18) says "It is not true that aliquis dicat, quod Mathematici tunc faciunt mendacium quia considerant ista, quasi essent abstracta a motu, et materia, quae tamen sunt coniuncta materiae. Respondet, quod non faciunt mendacium quia Mathematicus non considerat, utrum id, de quo demonstrat suas passiones, sit coniunctum materiae, vel abstractum a materia." This is not the place to treat of the many interesting logical, as well as psychological, discussions which have taken place concerning precision, which is one of the subjects which the scholastics treated in a comparatively modern way, although it leads directly to the question of nominalism and realism. It may, however, be mentioned that Scotus in many places draws a certain distinction variously designated by him and his followers (its nature and application is perhaps made as clear as anywhere in the *Opus Oxon.* III, xliii qu. unica, "Utrum Christus fuerit homo in triduo," i. e. between the crucifixion and the resurrection), which the Thomists notably dispute. There is some account of the matter in Chauvinus, *Lectura* (2d ed.) under "Precision." *Dictionary of Philosophy and Psychology*, vol. 2, pp. 323-4, Macmillan Co., New York, edition of 1911.

joined cannot be supposed without the conception, whereas the conception can generally be supposed without these elements. Now, empirical psychology discovers the occasion of the introduction of a conception, and we have only to ascertain what conception already lies in the data which is united to that of substance by the first conception, but which cannot be supposed without this first conception, to have the next conception in order in passing from being to substance

It may be noticed that, throughout this process, *introspection* is not resorted to. Nothing is assumed respecting the subjective elements of consciousness which cannot be securely inferred from the objective elements

551. The conception of *being* arises upon the formation of a proposition. A proposition always has, besides a term to express the substance, another to express the quality of that substance, and the function of the conception of being is to unite the quality to the substance. Quality, therefore, in its very widest sense, is the first conception in order in passing from being to substance

Quality seems at first sight to be given in the impression. Such results of introspection are untrustworthy. A proposition asserts the applicability of a mediate conception to a more immediate one. Since this is *asserted*, the more mediate conception is clearly regarded independently of this circumstance, for otherwise the two conceptions would not be distinguished, but one would be thought through the other, without this latter being an object of thought, at all. The mediate conception, then, in order to be *asserted* to be applicable to the other, must first be considered without regard to this circumstance, and taken immediately. But, taken immediately, it transcends what is given (the more immediate conception), and its applicability to the latter is hypothetical. Take, for example, the proposition, "This stove is black." Here the conception of *this stove* is the more immediate, that of *black* the more mediate, which latter, to be predicated of the former, must be discriminated from it and considered *in itself*, not as applied to an object, but simply as embodying a quality, *blackness*. Now this *blackness* is a pure species or abstraction and its application to *this stove* is entirely hypothetical. The same thing is meant by "the stove is black," as by "there is blackness in the stove."

Embodying blackness is the equivalent of *black*.¹ The proof is this. These conceptions are applied indifferently to precisely the same facts. If, therefore, they were different, the one which was first applied would fulfil every function of the other, so that one of them would be superfluous. Now a superfluous conception is an arbitrary fiction, whereas elementary conceptions arise only upon the requirement of experience; so that a superfluous elementary conception is impossible. Moreover, the conception of a pure abstraction is indispensable, because we cannot comprehend an agreement of two things, except as an agreement in some *respect*, and this respect is such a pure abstraction as blackness. Such a pure abstraction, reference to which constitutes a *quality* or general attribute, may be termed a *ground*.

Reference to a ground cannot be prescinded from being, but being can be prescinded from it.

552 Empirical psychology has established the fact that we can know a quality only by means of its contrast with or similarity to another. By contrast and agreement a thing is referred to a correlate, if this term may be used in a wider sense than usual. The occasion of the introduction of the conception of reference to a ground is the reference to a correlate, and this is, therefore, the next conception in order.

Reference to a correlate cannot be prescinded from reference to a ground, but reference to a ground may be prescinded from reference to a correlate.

553. The occasion of reference to a correlate is obviously by comparison. This act has not been sufficiently studied by the psychologists, and it will, therefore, be necessary to adduce some examples to show in what it consists. Suppose we wish to compare the letters p and b. We may imagine one of them to be turned over on the line of writing as an axis, then laid upon the other, and finally to become transparent so that the other can be seen through it. In this way we shall form a new image which mediates between the images of the two letters, inasmuch as it represents one of them to be (when turned over)

he likeness of the other. Again, suppose we think of a murderer as being in relation to a murdered person; in this case

¹ This agrees with the author of "*De Generibus et Speciebus*," *Ouvrages Inédits d'Abelard*, p. 528, [edited by V. Cousin, Paris, 1836].

we conceive the act of the murder, and in this conception it is represented that corresponding to every murderer (as well as to every murder) there is a murdered person, and thus we resort again to a mediating representation which represents the relate as standing for a correlate with which the mediating representation is itself in relation. Again, suppose we look up the word *homme* in a French dictionary, we shall find opposite to it the word *man*, which, so placed, represents *homme* as representing the same two-legged creature which *man* itself represents. By a further accumulation of instances, it would be found that every comparison requires, besides the related thing, the ground, and the correlate, also a *mediating representation which represents the relate to be a representation of the same correlate which this mediating representation itself represents*. Such a mediating representation may be termed an *interpretant*, because it fulfils the office of an interpreter, who says that a foreigner says the same thing which he himself says. The term representation is here to be understood in a very extended sense, which can be explained by instances better than by a definition. In this sense, a word represents a thing to the conception in the mind of the hearer, a portrait represents the person for whom it is intended to the conception of recognition, a weathercock represents the direction of the wind to the conception of him who understands it, a barrister represents his client to the judge and jury whom he influences.

Every reference to a correlate, then, conjoins to the substance the conception of a reference to an interpretant, and this is, therefore, the next conception in order in passing from being to substance.

Reference to an interpretant cannot be prescinded from reference to a correlate, but the latter can be prescinded from the former.

554 Reference to an interpretant is rendered possible and justified by that which renders possible and justifies comparison. But that is clearly the diversity of impressions. If we had but one impression, it would not require to be reduced to unity, and would therefore not need to be thought of as referred to an interpretant, and the conception of reference to an interpretant would not arise. But since there is a manifold of impressions, we have a feeling of complication or confusion,

which leads us to differentiate this impression from that, and then, having been differentiated, they require to be brought to unity. Now they are not brought to unity until we conceive them together as being *ours*, that is, until we refer them to a conception as their interpretant. Thus, the reference to an interpretant arises upon the holding together of diverse impressions, and therefore it does not join a conception to the substance, as the other two references do, but unites directly the manifold of the substance itself. It is, therefore, the last conception in order in passing from being to substance.

555. The five conceptions thus obtained, for reasons which will be sufficiently obvious, may be termed *categories*. That is,

Being

Quality (reference to a ground)

Relation (reference to a correlate)

Representation (reference to an interpretant)

Substance

The three intermediate conceptions may be termed accidents

556. This passage from the many to the one is numerical. The conception of a *third* is that of an object which is so related to two others, that one of these must be related to the other in the same way in which the third is related to that other. Now this coincides with the conception of an interpretant. An *other* is plainly equivalent to a *correlate*. The conception of second differs from that of other, in implying the possibility of a third. In the same way, the conception of *self* implies the possibility of an *other*. The *ground* is the self abstracted from the concreteness which implies the possibility of another.

557. Since no one of the categories can be prescinded from those above it, the list of supposable objects which they afford is,

What is.

Quale (that which refers to a ground)

Relate (that which refers to ground and correlate)

Representamen (that which refers to ground, correlate, and interpretant)

It

558 A quality may have a special determination which prevents its being prescinded from reference to a correlate. Hence there are two kinds of relation.

First That of relates whose reference to a ground is a prescindible or internal quality

Second That of relates whose reference to a ground is an unprescindible or relative quality

In the former case, the relation is a mere *concurrence* of the correlates in one character, and the relate and correlate are not distinguished. In the latter case the correlate is set over against the relate, and there is in some sense an *opposition*.

Relates of the first kind are brought into relation simply by their agreement. But mere disagreement (unrecognized) does not constitute relation, and therefore relates of the second kind are only brought into relation by correspondence in fact.

A reference to a ground may also be such that it cannot be prescinded from a reference to an interpretant. In this case it may be termed an *imputed* quality. If the reference of a relate to its ground can be prescinded from reference to an interpretant, its relation to its correlate is a mere concurrence or community in the possession of a quality, and therefore the reference to a correlate can be prescinded from reference to an interpretant. It follows that there are three kinds of representations.

First Those whose relation to their objects is a mere community in some quality, and these representations may be termed *likenesses*.*

Second Those whose relation to their objects consists in a correspondence in fact, and these may be termed *indices* or *signs* †

Third Those the ground of whose relation to their objects is an imputed character, which are the same as *general signs*, and these may be termed *symbols*.

559 I shall now show how the three conceptions of reference to a ground, reference to an object, and reference to an interpretant are the fundamental ones of at least one universal science, that of logic. Logic is said to treat of second intentions

* In later writings called "icons."

† In later writings an index is always taken to be but one of many kinds of signs, a sign being understood in some sense similar to that g. in 541.

as applied to first.* It would lead me too far away from the matter in hand to discuss the truth of this statement, I shall simply adopt it as one which seems to me to afford a good definition of the subject-genus of this science. Now, second intentions are the objects of the understanding considered as representations, and the first intentions to which they apply are the objects of those representations. The objects of the understanding, considered as representations, are symbols, that is, signs which are at least potentially general. But the rules of logic hold good of any symbols, of those which are written or spoken as well as of those which are thought. They have no immediate application to likenesses or indices, because no arguments can be constructed of these alone, but do apply to all symbols. All symbols, indeed, are in one sense relative to the understanding, but only in the sense in which also all things are relative to the understanding. On this account, therefore, the relation to the understanding need not be expressed in the definition of the sphere of logic, since it determines no limitation of that sphere. But a distinction can be made between concepts which are supposed to have no existence except so far as they are actually present to the understanding, and external symbols which still retain their character of symbols so long as they are only *capable* of being understood. And as the rules of logic apply to these latter as much as to the former (and though only through the former, yet this character, since it belongs to all things, is no limitation), it follows that logic has for its subject-genus all symbols and not merely concepts.¹ We come, therefore, to this, that logic treats of the reference of symbols in general to their objects. In this view it is one of a trivium of conceivable sciences. The first would treat of the formal conditions of

* See Peirce's definition in the *Century Dictionary* (1889) *Intention* 8, also Albertus Magnus, *Meta* I, 1, 1, and Th Aquinas, *Meta* IV, 4, f 43 v A.

¹ Herbart says [*Lehrbuch*, 2 A, 1^{te} Kap, §34] "Unsre sämmtlichen Gedanken lassen sich von zwei Seiten betrachten, theils als Thätigkeiten unseres Geistes, theils in Hinsicht dessen, *was* durch sie gedacht wird. In letzterer Beziehung heissen sie *Begriffe*, welches Wort, indem es das *Begriffene* bezeichnet, zu abstrahiren gebietet von der Art und Weise, wie wir den Gedanken empfangen, produciren oder reproduciren mögen." But the whole difference between a concept and an external sign lies in these respects which logic ought, according to Herbart, to abstract from

symbols having meaning, that is of the reference of symbols in general to their grounds or imputed characters, and this might be called formal grammar,* the second, logic,† would treat of the formal conditions of the truth of symbols; and the third would treat of the formal conditions of the force of symbols, or their power of appealing to a mind, that is, of their reference in general to interpretants, and this might be called formal rhetoric.‡

There would be a general division of symbols, common to all these sciences, namely, into,

1°. Symbols which directly determine only their *grounds* or imputed qualities, and are thus but sums of marks or *terms*;

2°. Symbols which also independently determine their *objects* by means of other term or terms, and thus, expressing their own objective validity, become capable of truth or falsehood, that is, are *propositions*, and,

3°. Symbols which also independently determine their *interpretants*, and thus the minds to which they appeal, by premissing a proposition or propositions which such a mind is to admit. These are *arguments*.

And it is remarkable that, among all the definitions of the proposition, for example, as the *oratio indicativa*, as the subsumption of an object under a concept, as the expression of the relation of two concepts, and as the indication of the mutable ground of appearance, there is, perhaps, not one in which the conception of reference to an object or correlate is not the important one. In the same way, the conception of reference to an interpretant or third, is always prominent in the definitions of argument.

In a proposition, the term which separately indicates the object of the symbol is termed the subject, and that which indicates the ground is termed the predicate. The objects indicated by the subject (which are always potentially a plurality — at least, of phases or appearances) are therefore stated by the proposition to be related to one another on the

* Later called Speculative Grammar or Statics.

† Later called Critical Logic or Critic.

‡ Later called Speculative Rhetoric or Methodology.

ground of the character indicated by the predicate. Now this relation may be either a concurrence or an opposition. Propositions of concurrence are those which are usually considered in logic; but I have shown in a paper upon the classification of arguments* that it is also necessary to consider separately propositions of opposition, if we are to take account of such arguments as the following:

Whatever is the half of anything is less than that of which it is the half:

A is half of B;
A is less than B.

The subject of such a proposition is separated into two terms, a "subject nominative" and an "object accusative"

In an argument, the premisses form a representation of the conclusion, because they indicate the interpretant of the argument, or representation representing it to represent its object. The premisses may afford a likeness, index, or symbol of the conclusion. In deductive argument, the conclusion is represented by the premisses as by a general sign under which it is contained. In hypotheses, something *like* the conclusion is proved, that is, the premisses form a likeness of the conclusion. Take, for example, the following argument:

M is, for instance, P^I , P^{II} , P^{III} , and P^{IV} ;
S is P^I , P^{II} , P^{III} , and P^{IV} ;
 \therefore S is M.

Here the first premiss amounts to this, that " P^I , P^{II} , P^{III} , and P^{IV} " is a likeness of M, and thus the premisses are or represent a likeness of the conclusion. That it is different with induction another example will show.

S^I , S^{II} , S^{III} , and S^{IV} are taken as samples of the collection M,
 S^I , S^{II} , S^{III} , and S^{IV} are P;
 \therefore All M is P.

Hence the first premiss amounts to saying that " S^I , S^{II} , S^{III} , and S^{IV} " is an index of M. Hence the premisses are an index of the conclusion.

* See vol. 2, bk. III, ch. 2.

The other divisions of terms, propositions, and arguments arise from the distinction of extension and comprehension. I propose to treat this subject in a subsequent paper.* But I will so far anticipate that as to say that there is, first, the direct reference of a symbol to its objects, or its denotation; second, the reference of the symbol to its ground, through its object, that is, its reference to the common characters of its objects, or its connotation, and third, its reference to its interpretants through its object, that is, its reference to all the synthetical propositions in which its objects in common are subject or predicate, and this I term the information it embodies. And as every addition to what it denotes, or to what it connotes, is effected by means of a distinct proposition of this kind, it follows that the extension and comprehension of a term are in an inverse relation, as long as the information remains the same, and that every increase of information is accompanied by an increase of one or other of these two quantities. It may be observed that extension and comprehension are very often taken in other senses in which this last proposition is not true.

This is an imperfect view of the application which the conceptions which, according to our analysis, are the most fundamental ones find in the sphere of logic. It is believed, however, that it is sufficient to show that at least something may be usefully suggested by considering this science in this light.

§2 NOTES ON THE PRECEDING†‡

560 Before I came to man's estate, being greatly impressed with Kant's *Critic of the Pure Reason*, my father, who was an eminent mathematician, pointed out to me lacunæ in Kant's reasoning which I should probably not otherwise have discovered. From Kant, I was led to an admiring study of Locke, Berkeley, and Hume and to that of Aristotle's *Organon*, *Metaphysics* and psychological treatises, and somewhat later derived the greatest advantage from a deeply pondering perusal of some of the works of medieval thinkers, St Augustine,

* Vol. 2, b1 II, ch. 5.

† 560-562 are from "Pragmatism," (Prag. [J]) c. 1905, 563 is from a fragment of a proposed "DI" Lecture c. 1898, 564-567 are from a fragment c. 1899.

‡ See also 2 340.

Abelard, and John of Salisbury, with related fragments from St. Thomas Aquinas, most especially from John of Duns, the Scot (Duns being the name of a then not unimportant place in East Lothian), and from William of Ockham. So far as a modern man of science can share the ideas of those medieval theologians, I ultimately came to approve the opinions of Duns, although I think he inclines too much toward nominalism. In my studies of Kant's great *Critic*, which I almost knew by heart, I was very much struck by the fact that, although, according to his own account of the matter, his whole philosophy rests upon his "functions of judgment," or logical divisions of propositions, and upon the relation of his "categories" to them, yet his examination of them is most hasty, superficial, trivial, and even trifling, while throughout his works, replete as they are with evidences of logical genius, there is manifest a most astounding ignorance of the traditional logic, even of the very *Summulæ Logicales*, the elementary schoolbook of the Plantagenet era. Now although a beastlike superficiality and lack of generalizing thought spreads like a pall over the writings of the scholastic masters of logic, yet the minute thoroughness with which they examined every problem that came within their ken renders it hard to conceive in this twentieth century how a really earnest student, goaded to the study of logic by the momentous importance that Kant attached to its details, could have reconciled himself to treating it in the debonnair and *dégagé* fashion that he did. I was thus stimulated to independent inquiry into the logical support of the fundamental concepts called categories.

561. The first question, and it was a question of supreme importance requiring not only utter abandonment of all bias, but also a most cautious yet vigorously active research, was whether or not the fundamental categories of thought really have that sort of dependence upon formal logic that Kant asserted. I became thoroughly convinced that such a relation really did and must exist. After a series of inquiries, I came to see that Kant ought not to have confined himself to divisions of propositions, or "judgments," as the Germans confuse the subject by calling them, but ought to have taken account of all elementary and significant differences of form among signs of all sorts, and that, above all, he ought not to have

left out of account fundamental forms of reasonings. At last, after the hardest two years' mental work that I have ever done in my life, I found myself with but a single assured result of any positive importance. This was that there are but three elementary forms of predication or signification, which as I originally named them (but with bracketed additions now made to render the terms more intelligible) were *qualities* (of feeling), (dyadic) *relations*, and (predications of) *representations*.

562. It must have been in 1866 that Professor De Morgan honored the unknown beginner in philosophy that I then was (for I had not earnestly studied it for more than ten years, which is a short apprenticeship in this most difficult of subjects), by sending me a copy of his memoir "On the Logic of Relations, etc."* I at once fell to upon it, and before many weeks had come to see in it, as De Morgan had already seen, a brilliant and astonishing illumination of every corner and every vista of logic. Let me pause to say that no decent semblance of justice has ever been done to De Morgan, owing to his not having brought anything to its final shape. Even his personal students, reverent as they perforce were, never sufficiently understood that his was the work of an exploring expedition, which every day comes upon new forms for the study of which leisure is, at the moment, lacking, because additional novelties are coming in and requiring note. He stood indeed like Aladdin (or whoever it was) gazing upon the overwhelming riches of Ali Baba's cave, scarce capable of making a rough inventory of them. But what De Morgan, with his strictly mathematical and indisputable method, actually accomplished in the way of examination of all the strange forms with which he had enriched the science of logic was not slight and was performed in a truly scientific spirit not unanimated by true genius. It was quite twenty-five years before my studies of it all reached what may be called a near approach toward a provisionally final result (absolute finality never being presumable in any universal science), but a short time sufficed to furnish me with mathematical demonstration that indecomposable predicates are of three classes: first, those which, like neuter verbs, apply but to a single subject, secondly, those which like

* "On the Syllogism IV, and the Logic of Relations," *Cambridge Philosophical Transactions*, vol. 10, pp. 331-358.

simple transitive verbs have two subjects each, called in the traditional nomenclature of grammar (generally less philosophical than that of logic) the "subject nominative" and the "object accusative," although the perfect equivalence of meaning between "A affects B" and "B is affected by A" plainly shows that the two things they denote are equally referred to in the assertion; and thirdly, those predicates which have three such subjects, or correlates. These last (though the purely formal, mathematical method of De Morgan does not, as far as I see, warrant this) never express mere brute fact, but always some relation of an intellectual nature, being either constituted by action of a mental kind or implying some general law.

563. As early as 1860, when I knew nothing of any German philosopher except Kant, who had been my revered master for three or four years, I was much struck with a certain indication that Kant's list of categories might be a part of a larger system of conceptions. For instance, the categories of relation — reaction, causality, and subsistence — are so many different modes of *necessity*, which is a category of modality, and in like manner, the categories of quality — negation, qualification, degree, and intrinsic attribution — are so many relations of inherence, which is a category of relation. Thus, as the categories of the third group are to those of the fourth, so are those of the second to those of the third; and I fancied, at least, that the categories of quantity, unity, plurality, totality, were, in like manner, different intrinsic attributions of quality. Moreover, if I asked myself what was the difference between the three categories of quality, the answer I gave was that negation was a merely *possible* inherence, quality in degree a *contingent* inherence, and intrinsic attribution a *necessary* inherence, so that the categories of the second group are distinguished by means of those of the fourth, and in like manner, it seemed to me that to the question how the categories of quantity — unity, plurality, totality — differ, the answer should be that *totality*, or system, is the intrinsic attribution which results from reactions, *plurality* that which results from causality, and *unity* that which results from inherence. This led me to ask, what are the conceptions which are distinguished by negative unity, qualitative unity, and intrinsic unity? I also asked, what are the different kinds of necessity by which

reaction, causality, and inherence are distinguished? I will not trouble the reader with my answers to these and similar questions. Suffice it to say that I seemed to myself to be blindly groping among a deranged system of conceptions, and after trying to solve the puzzle in a direct speculative, a physical, a historical, and a psychological manner, I finally concluded the only way was to attack it as Kant had done from the side of formal logic.

564 I must acknowledge some previous errors committed by me in expounding my division of signs into *icons*, *indices* and *symbols*. At the time I first published this division in 1867 I had been studying the logic of relatives for so short a time that it was not until three years later that I was ready to go to print with my first memoir on that subject. I had hardly commenced the cultivation of that land which De Morgan had cleared. I already, however, saw what had escaped that eminent master, that besides non-relative characters, and besides relations between pairs of objects, there was a third category of characters, and but this third. This third class really consists of plural relations, all of which may be regarded as compounds of triadic relations, that is, of relations between triads of objects. A very broad and important class of triadic characters [consists of] representations. A representation is that character of a thing by virtue of which, for the production of a certain mental effect, it may stand in place of another thing. The thing having this character I term a *representamen*, the mental effect, or thought, its *interpretant*, the thing for which it stands, its *object*.

565 In 1867, although I had proof (duly published)* that there was only a third category of characters besides non-relative characters and dual relations, yet I had not discovered that plural relations (which it had not occurred to me were sometimes not reducible to conjunctions of dual relations) constitute that third class. I saw that there must be a conception of which I could make out some features, but being unfamiliar with it in its generality, I quite naturally mistook it for that conception of *representation* which I obtained by generalizing for this very purpose the idea of a sign. I did not generalize enough, a form of error into which greater minds than mine

might fall. I supposed the third class of characters was quite covered by the representative characters. Accordingly, I declared all characters to be divisible into *qualities* (non-relative characters), *relations*, and *representations*, instead of into non-relative characters, dual relations, and plural relations.

566. I observed in 1867* that dual relations are of two kinds according as they are or are not constituted by the relate and correlate possessing non-relative characters. This is correct. Two blue objects are *ipso facto* in relation to one another. It is important to remark that this is not true of characters so far as they are dissimilar. Thus, an orange and justice are not brought into relation to one another by the disparateness of their characters. Drag them into comparison, and then they stand in the relation of dissimilarity, a relation of a quite complex nature. But as the orange and justice exist, their qualities do not constitute a relation of dissimilarity. It must not be overlooked that dissimilarity is not simple otherness. Otherness belongs to heccecities. It is the inseparable spouse of identity: wherever there is identity there is necessarily otherness; and in whatever field there is true otherness there is necessarily identity. Since identity belongs exclusively to that which is *hic et nunc*, so likewise must otherness. It is, therefore, in a sense a dynamical relation, though only a relation of reason. It exists only so far as the objects concerned are, or are liable to be, forcibly brought together before the attention. Dissimilarity is a relation between characters consisting in otherness of all the subjects of those characters. Consequently, being an otherness, it is a dynamo-logical relation, existing only so far as the characters are, or are liable to be, brought into comparison by something besides those characters in themselves.

567. Similarity, on the other hand, is of quite a different nature. The forms of the words *similarity* and *dissimilarity* suggest that one is the negative of the other, which is absurd, since everything is both similar and dissimilar to everything else. Two characters, being of the nature of ideas, are, in a measure, the same. Their mere existence constitutes a unity of the two, or, in other words, pairs them. Things are similar and dissimilar so far as their characters are so. We see, then,

* 558

that the first category of relations embraces only similarities, while the second, embracing all other relations, may be termed dynamical relations. At the same time, we see from the above remarks that the dynamical relations at once divide themselves into logical, hemilogical and non-logical relations. By logical relations, I mean those in respect to which all pairs [of] objects in the universe are alike, by hemilogical relations those in respect to which there is in reference to each object in the universe only one object (perhaps itself) or some definite multitude of objects which are different from others, while the alogical relations include all other cases. The logical and hemilogical relations belong to the old class of relations of reason, while relations *in re* are alogical. But there are a few not unimportant relations of reason which are likewise alogical. In my paper of 1867, I committed the error of identifying those relations constituted by non-relative characters with relations of equiparance, that is, with necessarily mutual relations, and the dynamical relations with relations of disquiparance, or possibly non-mutual relations. Subsequently, falling out of one error into another, I identified the two classes respectively with relations of reason and relations *in re*.

CHAPTER 7

TRIADOMANY*

The author's response to the anticipated suspicion that he attaches a superstitious or fanciful importance to the number three, and forces divisions to a Procrustean bed of trichotomy.

568 I fully admit that there is a not uncommon craze for trichotomies. I do not know but the psychiatrists have provided a name for it. If not, they should "Trichimania," [?] unfortunately, happens to be preempted for a totally different passion, but it might be called *triadomany*. I am not so afflicted, but I find myself obliged, for truth's sake, to make such a large number of trichotomies that I could not [but] wonder if my readers, especially those of them who are in the way of knowing how common the malady is, should suspect, or even opine, that I am a victim of it. But I am now and here going to convince those who are open to conviction, that it is not so, but that there is a good reason why a thorough student of the subject of this book† should be led to make trichotomies, that the nature of the science is such that not only is it to be expected that it should involve real trichotomies, but furthermore, that there is a cause that tends to give this form even to faulty divisions, such as a student, thirsting for thoroughness and full of anxiety lest he omit any branch of his subject, will be liable to fall into. Were it not for this cause, the trichotomic form would, as I shall show, be a strong argument in confirmation of the reasoning whose fruit should take this form.

569. My first argument in repelling the suspicion that the prevalence of trichotomies in my system is due purely to my predilection for that form, will be that were that predilection so potent, it would inevitably have made me equally given over to the trichotomic form of classification of whatever sub-

* 1910

† Apparently "The Quest of Quest — An Inquiry into the Conditions of the Success in Inquiry (beyond the collection and observation of facts)," of which but a few pages were written

ject I might work upon But this is not at all the case I once endeavored by going over the different classifications that I have made of subjects not of the special kind in which I find trichotomies to abound — a kind which I shall define below — to ascertain the relative frequency of different numbers of sub-classes in the divisions of classes generally, when the divisions were such as seemed to me undoubtedly to possess objective reality I do not think my results of much value, on account of the great difference of the proportions in different kinds of subjects Nevertheless, I will set them down I found that among twenty-nine divisions of subjects not of the kind that specially abound in trichotomies, there would be eleven dichotomies, five trichotomies, and thirteen divisions into more than three parts The fact that I got such a result, however rough it was, suffices to show that I have no marked predilection for trichotomies in general

570 I come now to a second argument, or rather to a series of considerations not altogether foreign to what I have been saying. The warm friends who urged upon me these objections — and nothing can be more precious to a sincere student than frank and strongly put objections — were naturalists belonging to that family of minds to whom mathematics, even the simplest, seems a closed book I would point out to them, or, to speak more accurately, I would tell them, that there is a world-wide difference between the divisions that one recognizes in classes whose essence one can comprehend, and the varieties that one observes from the outside, as one does those of objects of natural history, without being able to guess why they should be such as they seem to be, nor, except in the higher divisions, being at all sure that we have the full list of the parts, nor whether they result from a single division or from several, one succeeding another

571. Agassiz, in his *Essay on Classification*, described well — I do not say perfectly, but relatively, well — what a classification of animals ought to be But subsequent zoologists seem to find that when he came to adjusting his idea to the facts of the animal kingdom, it did not seem to be a good fit What wonder? It required the taxonomist to say what the idea of the Creator was, and the different manners in which the one idea was designed to be carried out How can a

creature so place himself at the point of view of his Creator?

572 Soon the zoologists began to classify according to the course of evolution. No doubt this had the advantage of turning their minds to problems within the scope of science. But I venture upon the observation that, granting the perfect success of their investigation, what they so ascertain is precisely the genealogy of species. Now genealogy is not at all the same thing as logical division. Nothing renders this clearer than the studies of Galton and others upon the phenomena of the inheritance of characters. I mean that this is shown even to those who have no definite idea of what logical division is, while for those who know what it is, the studies of Galton gave emphasis and illustration to what they must have fully realized already.

But when my critical friends counsel me to consider the marvellous multiplicity of sub-groups into which each group of the animal kingdom is divided at each division, I accept their suggestion, and turn to Huxley's famous volume on *The Anatomy of Vertebrate Animals*. I find that he first divides this branch into three provinces the *Ichthyopsida*, the *Sauropsida*,¹ and the *Mammalia*. He divides each Province into Classes.*

¹ No ingenuity can make such manufactured words invariably suggest their meaning. A tortoise may perhaps "look like a lizard," but it is hard to see how a turkey or a heron does.

* The manuscript breaks off here.

BOOK IV

THE NORMATIVE SCIENCES

CHAPTER 1

INTRODUCTION*

573 *Normative Science*† forms the mid-portion of cœnoscropy and its most characteristic part . . . Logic, regarded from one instructive, though partial and narrow, point of view, is the theory of deliberate thinking To say that any thinking is deliberate is to imply that it is controlled with a view to making it conform to a purpose or ideal. Thinking is universally acknowledged to be an active operation Consequently, the control of thinking with a view to its conformity to a standard or ideal is a special case of the control of action to make it conform to a standard, and the theory of the former must be a special determination of the theory of the latter Now special theories should always be made to rest upon the general theories of which they are amplifications The present writer takes the theory of the control of conduct, and of action in general, so as to conform to an ideal, as being the mid-normative science, that is, as the second of the trio, and as that one of the three sciences in which the distinctive characters of normative science are most strongly marked He will not undertake to pronounce any other distribution of the matter of normative science to be wrong, but, according to the dissection of that matter which seems to him to separate studies as they must be separated in research, such will be the mid-normative science Since the normative sciences are usually held to be three, Logic, Ethics, and [Esthetics], and since he, too, makes them three, he would term the mid-

* From the "Basis of Pragmatism " 1906 See 5 549

† Peirce came to recognize the nature of the Normative Sciences at a very late date (c 1903) He wrote practically nothing on esthetics (see 2 197) and linked most of his discussions of practics and ethics with those on pragmatism and logic Logic, the third of the Normative Sciences, being the subject on which Peirce spent about sixty years of intensive study and on which he left the most manuscripts, is the special topic of Volumes Two, Three, and Four The present book, accordingly, dealing as it mainly does with but two subjects insufficiently studied, is unusually, but necessarily, short and unsatisfactory.

normative science ethics if this did not seem to be forbidden by the received acceptance of that term. He accordingly proposes to name the mid-normative science, as such (whatever its content may be) *antethics*, that is, that which is put in place of ethics, the usual second member of the trio. It is the writer's opinion that this *antethics* should be the theory of the conformity of action to an ideal. Its name, as such, will naturally be *practices*. Ethics is not practices, first, because ethics involves more than the theory of such conformity, namely, it involves the theory of the ideal itself, the nature of the *summum bonum*; and secondly, because, in so far as *ethics* studies the conformity of conduct to an ideal, it is limited to a particular ideal, which, whatever the professions of moralists may be, is in fact nothing but a sort of composite photograph of the conscience of the members of the community. In short, it is nothing but a traditional standard, accepted, very wisely, without radical criticism, but with a silly pretence of critical examination. The science of morality, virtuous conduct, right-living, can hardly claim a place among the heuristic sciences.

574. It has been a great, but frequent, error of writers on ethics to confound an ideal of conduct with a motive to action. The truth is that these two objects belong to different categories. Every action has a motive, but an ideal only belongs to a line [of] conduct which is deliberate. To say that conduct is deliberate implies that each action, or each important action, is reviewed by the actor and that his judgment is passed upon it, as to whether he wishes his future conduct to be like that or not. His ideal is the kind of conduct which attracts him upon review. His self-criticism, followed by a more or less conscious resolution that in its turn excites a determination of his habit, will, with the aid of the sequelæ, *modify* a future action, but it will not generally be a moving cause to action. It is an almost purely passive liking for a way of doing whatever he may be moved to do. Although it affects his own conduct, and nobody else's, yet the quality of feeling (for it is merely a quality of feeling) is just the same, whether his own conduct or that of another person, real or imaginary, is the object of the feeling; or whether it be connected with the thought of any action or not. If conduct is to be thoroughly deliberate, the ideal must be a habit of feeling which has grown up under the

influence of a course of self-criticisms and of hetero-criticisms, and the theory of the deliberate formation of such habits of feeling is what ought to be meant by *esthetics* * It is true that the Germans, who invented the word, and have done the most toward developing the science, limit it to *taste*, that is, to the action of the *Spieltrieb* from which deep and earnest emotion would seem to be excluded. But in the writer's opinion the theory is the same, whether it be a question of forming a taste in bonnets or of a preference between electrocution and decapitation, or between supporting one's family by agriculture or by highway robbery. The difference of earnestness is of vast practical moment, but it has nothing to do with heuretic science.

According to this view, esthetics, practics, and logic form one distinctly marked whole, one separate department of heuretic science, and the question where precisely the lines of separation between them are to be drawn is quite secondary. It is clear, however, that esthetics relates to feeling, practics to action, logic to thought

* Cf 5 130, 5 553

CHAPTER 2

ULTIMATE GOODS*

575. It is pretty generally admitted that logic is a *normative* science, that is to say, it not only lays down rules which ought to be, but need not be followed, but it is the analysis of the conditions of attainment of something of which purpose is an essential ingredient. It is, therefore, closely related to an art; from which, however, it differs markedly in that its primary interest lies in understanding those conditions, and only secondarily in aiding the accomplishment of the purpose. Its business is analysis, or, as some writers prefer to say, definition.

The word *normative* was invented in the school of Schleiermacher.† The majority of writers who make use of it tell us that there are three normative sciences, logic, esthetics, and ethics, the doctrines of the true, the beautiful, and the good, a triad of ideals which has been recognized since antiquity. On the other hand, we quite commonly find the term "normative science" restricted to logic and ethics, and Schleiermacher himself states their purposes in a way that seems to give room for no third. "The one, he says, relates to making thought conform to being, the other, to making being conform to thought. There seems to be much justice in this restriction. For that which renders logic and ethics peculiarly normative is that nothing can be either logically true or morally good without a purpose to be so. For a proposition, and especially the conclusion of an argument, which is only accidentally true is not logical. On the other hand, a thing is beautiful or ugly quite irrespective of any purpose to be so. It would seem, therefore, that esthetics is no more essentially normative than any nomological science. The science of optics, for example, might very well be regarded as the study of the conditions to be observed in making use of light. Under such a conception, nothing

* "Minute Logic," ch 4, 1902-3

† See 2 8n

essential to optics would be omitted, nor anything foreign to it inserted. Those writers, however, who stand out for the trinity of normative sciences do so upon the ground that they correspond to three fundamental categories of objects of desire. As to that, the logician may be exempted from inquiring whether the beautiful is a distinct ideal or not, but he is bound to say how it may be with the true, and accordingly the intention of this chapter is to lay the foundation for the doctrine, which will appear more and more evident as we proceed, that that truth the conditions of which the logician endeavors to analyze, and which is the goal of the reasoner's aspirations, is nothing but a phase of the *summum bonum* which forms the subject of pure ethics, and that neither of those men can really understand himself until he perceives clearly that it is so.

576 I hope I shall not be thought to wander if I note one observation by the way, before formally settling down to the question. Were there nothing in reasoning more than the old traditional treatises set forth, then a rogue might be as good a reasoner as a man of honor, although a coward could not, even under such an idea of reasoning. But in induction a habit of probity is needed for success: a trickster is sure to play the confidence game upon himself. And in addition to probity, industry is essential. In the presumptive choice of hypotheses, still higher virtues are needed — a true elevation of soul. At the very lowest, a man must prefer the truth to his own interest and well-being and not merely to his bread and butter, and to his own vanity, too, if he is to do much in science. This will appear in the logical discussion, and it is thoroughly borne out by examining the characters of scientific men and of great heuristic students of all kinds. It is a remarkable fact that, excluding idle tales about pre-socratic philosophers, all history does not tell of a single man who has considerably increased human knowledge (unless theology be knowledge) having been proved a criminal. Of the four or five instances usually adduced, Seneca neither contributed to knowledge nor has been convicted of positive crime, Calvin was nothing but a theologian, the attacks upon Erasmus are beneath contempt, Bacon was no man of science, but only a grandiose writer, whose very style betrays him, Dr. Dodd was an ordinary commentator on the Bible; and nothing was proved against

Libri. The same may be said of whispers that this or that naturalist purloined specimens in the interest of science. The lofty character of the true man of science, physical or psychical, finds not one exception among a hundred. But it is needless to go to history for cases in which relatively small obliquities have prevented eminent scientists from achieving higher successes; for they abound in the experience of everybody who knows the scientific world from within. If it were true that every fallacy were a sin, logic would be reduced to a branch of moral philosophy. This is not true. But we can perceive that good reasoning and good morals are closely allied; and I suspect that with the further development of ethics this relation will be found to be even more intimate than we can, as yet, prove it to be.

577. There is room for doubt whether ethics is correctly described as a normative branch of philosophy. The doctrine of rights and duties is practical rather than normative; and if we are to use the word philosophy, as I intend to do, for that part of science which rests upon so much of experience as presses in upon every man during every hour of his waking life, then it is plain that the doctrine of rights and duties, which makes heavy drafts upon wisdom, or the knowledge which comes by reflection upon the total experience of a lifetime, as well as upon a learned acquaintance with the structure of the society in which one lives, stretches far beyond the familiar ground of philosophy. But the doctrine of rights and duties is a mere superstructure upon ethics proper. This groundwork philosophy will never disavow; for it is her pride and boast, the one branch of her work in which during the last three centuries an indisputable, steady progress has been made, not put to shame by the achievements of the special sciences. I wish as much could be said of logic. Concerning what, then, have all those writers whose subtle and beautiful discussions have built up the science of ethics been mainly occupying themselves? Surely not casuistry, or the determination of what under given circumstances ought to or may be done. They have been largely busied with the analysis of conscience, which as a psychological problem, mainly, belongs among the special psychical sciences. But the more important subject of their deliberations has been, What is good? Now this is hardly

a normative question. it is pre-normative. It does not ask for the conditions of fulfillment of a definitely accepted purpose, but asks what is to be sought, *not* for a reason, but back of every reason. Logic, as a true normative science, supposes the question of what is to be aimed at to be already answered before it could itself have been called into being. Pure ethics, philosophical ethics, is not normative, but pre-normative.

578 "If so, why this chapter?" I fear the reader will ask, and forthwith skip, as surplusage, the true life-germ of all the truths I have to unfold. "Never mind," you will say, "whether the aim which logic has in view is a good one, or not, as a matter of fact, we are interested in it. It is to learn the truth. no aim could be of more elementary simplicity. Let us turn to where we are told how to come to it." Well, if this aim is so readily comprehensible, suppose you tell me, to whom it does not seem so, what truth consists in. "Truth is the conformity of a representation to its object," says Kant. * One might make this statement more explicit, but for our present purpose it may pass. It is nearly correct, so far as it is intelligible. Only, what is that "object" which serves to define truth? Why it is the *reality* it is of such a nature as to be independent of representations of it, so that, taking any individual sign or any individual collection of signs (such, for example, as all the ideas that ever enter into a given man's head) there is some character which that thing possesses, whether that sign or any of the signs of that collection represents the thing as possessing that character or not. Very good. now only tell me what it means to say that an object possesses a character, and I shall be satisfied. But even now, in advance of our study of definition, [we can] sufficiently see that we can only reach a conception of the less known through the more known, and that consequently the only meaning which we can attach to the phrase that a thing "has a character" is that something is *true* of it. So there we are, after threading the passages of this labyrinth, already thrown out at that very conception of truth at which we entered it. Indeed, when one comes to consider it, how futile it was to imagine that we were to clear up the idea of *truth* by the more occult idea of *reality*!

579 Yet the logician will never be scientifically or safely

* See, e.g., *C. d. R. V* A58, 320, 462

equipped for his exploration, until he knows precisely what it is that he is seeking. The whole doctrine of logic depends upon that to a degree one could hardly force it. The best way will be to go back to the beginning and inquire what it is that we can be content to work for independently of any ulterior result. For the discussion of the moralists, who have not had logic in view, are not altogether adequate for our needs. In this inquiry we are not to look for any [discussion] leading to psychology, for the anatomy and physiology of the mind, or of the brain, though they may furnish a hint now and then, can after all not tell us that anything is desirable, except for some reason, while what we wish to know is what is desirable without any reason. Psychology might it is true, discover that there is no way whatever in [which] certain things could become objects of desire, but it can only make such a discovery by relying upon direct self-questioning, as [to] what we do or do not desire, and such premisses of psychology are here precisely the conclusions of which we are in quest. So we must make up our minds to rely entirely upon self-questioning, with here and there perhaps some secondary aid from psychology.

580. Such self-questioning produces no infallible response. On the contrary, consciousness may be set down as one of the most mendacious witnesses that ever was questioned. But it is the only witness there is, and all we can do is to put it in the sweat-box and torture the truth out of it, with such judgment as we can command.

581. What I propose now to do is to pass in review every one of the general classes of objects which anybody could suppose to be an ultimate good, and to question consciousness, first, as to whether or not each of these in turn could content us as the sole ultimate good independently of any ulterior result, and if not, whether it can be considered to be in itself a good at all, irrespective of its effects. I shall arrange my list so as to commence with the most particular satisfactions and proceed step by step to the most general. But since there are in each grade several kinds of satisfactions, I shall begin in each grade of generality with the most immediate and selfish and go on by steps to the most subservient.

582. I begin, then, with simple satisfactions of the moment. The most immediate of these is the simple satisfaction of a

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direct instinct I am thirsty and I want a drink. Now our shifty witness, consciousness, is very ready with her answer that a drink is good but that momentary satisfactions are not the only good. Let us not be in haste to accept either answer. Men might easily argue — indeed, do argue — that there *can* be no other good than the satisfaction of the moment's desire. But the moment I hear that word *can* used, where nothing in the world is pertinent but observations of what is, I cast the judgment aside as worthless. For "cannot be" means "not in accordance with a hypothetical construction" intended, this time, to represent human nature. But I do not care about hypothetical constructions. I just want to know whether a man *does* ever find any other satisfaction than the simple satisfaction of the moment. If there is nothing good but the simple satisfaction of this moment, and all other moments are nothing, I must be in a state of perfect satisfaction or perfect dissatisfaction. Is that so? Obviously not. I may wish for something in spite of accompanying disadvantages. Therefore, the simple satisfaction of the moment is not all. There is at least complexity. Now can the simple satisfaction of the moment be, in itself, any good at all? Here consciousness is emphatic in her reply that the drink is good, however small a good. But there can be no harm in a little cross-examination of the witness. An absolutely simple satisfaction will involve no comparison, no measure, no degree. It will be perfect, if it exists at all. Now let be supposed that it could be proved to you that, I will not say for a moment only, but for the entire duration of a millionth of a second, you were to enjoy a simple satisfaction, say that of an agreeable color sensation, with no effects whatever of any kind, and of course no memory of it. Then, since this satisfaction would be perfect and immeasurable, and would be, O Consciousness, you say, a good, at how much would you value it? How many years of purgatory would you be willing to endure for the sake of it? Come, speak up. Would you endure five minutes of toothache? For the *knowledge* that you had, or were about to have, the strange experience, perhaps. But this would be an effect. You must suppose that you were to be utterly ignorant of whether you had, or were about to have, any such feeling. Would it not be precisely the same thing as if this had happened to some other

being, say to a mosquito, with this difference, that the mosquito is your neighbor, with whom you have some grain of sympathy while this isolated instant would really have no existence at all? I think I hear you murmur that an absolutely simple satisfaction would be an absurdity. Then such satisfaction is no part of the good. Still, it might be said that this result is owing to the absurd hypothesis of simplicity.

583. Let us, then, next consider whether the perfect and prompt satisfaction of every instinct is the only ultimate good. Though I cannot recall it at all, I think it very likely that in my childhood I read of a malevolent fairy who pronounced this curse upon an infant that during his entire life whatever wish he should conceive should be instantly gratified. If he wished for a drink, a drink should be instantly before him. If he wished it to taste differently, it should taste differently. If he was tired of sloth and wished he were working, he should be putting forth his strength. Only two things would be debarred. The first restriction should be that vague dissatisfaction, mere ennui at having his own way, should not be enough. He must form a definite wish. And secondly, wishing that his wishes should not be gratified should only be gratified until he made a positive wish. The instant he did that the satisfaction should come. I do not think that consciousness herself could have the face to pronounce this state of things good. The only alleviation of it would be the state of imbecility in which the person would be engulfed. Now I ask whether, in view of this, the mere satisfaction of an impulse can be said to be *per se* a good, at all. Under certain circumstances, the satisfaction may be good, no doubt, but is it so *per se* and *simpliciter*? Here again, we find ourselves contemplating an absurdity. A satisfaction cannot be divorced from its circumstances. It results then that the gratification of an instinct is not *per se* any part of the good. Still, it might be said that this is only because we have supposed an impossible situation in which there was no providing for future desires.

584. We will, therefore, next consider whether provision for satisfying future instinctive desires is the only ultimate good, and if not, whether it is, in itself, a good at all. It will here be pertinent to remark that although the state of things last imagined would not be good for a man, yet it does not

seem to differ much from the conditions under which my dog, and mare, and poultry seem to be enviably happy. Still, perhaps there may be a delusion here. The dog, I can perceive, considers that there is a heavy weight of responsibility upon him, and so do the mature poultry. Even the mare is not without this feeling, and perhaps she is not so entirely happy as the others. If there were an idiot about the place, could we regard it as an ultimate good that he should thus have all his instincts gratified? I think not. If it would produce a state of content in the poor fellow's mind, and if for any reason that were a good, then, for the sake of that effect, it is undeniable that the state of things supposed would be good; but that would not make it an ultimate good, on the contrary, it would furnish a *reason* for the sake of which it would be good. These considerations are extremely pertinent to the case we are now to consider, which is that of a person engaged busily in providing for his next day's wants, with just enough uncertainty as to his probable success to keep industrious. If, for any reason, or without an ulterior reason, it is desirable that he should be happy, and if his mental development is so low that those conditions would make him happy, as possibly they might make some creatures zoologically human, then of course that would furnish an end as a means to which the state supposed would be good. But how is it with you, my Consciousness? Would you think it was reason enough for the creation of heaven and earth that it put you, or any other individual, into this condition of working for your living?

* There are about five pages missing at this point. The manuscript then continues by repeating some of the foregoing, goes on to list a number of ultimate "ends" proposed by the early Greeks and concludes with a one-hundred-and-twenty-five-page discussion on the order, history, and contents of the Platonic Dialogues. Except for a short digression which will appear as §7-§8, ch. 11, bk. I, vol. 6, the rest of the manuscript will not be published.

CHAPTER 3

AN ATTEMPTED CLASSIFICATION OF ENDS*

585. In the *Popular Science Monthly* for January, 1901, (LVIII *et seq*)† I enumerated a number of ethical classes of motives, meaning by a motive, not a spring of action, but an aim or end appearing ultimate to the agent. Any such classification may be rendered more minute by subdivisions, or broader by aggregations of classes. My endeavor was to make my enumeration about evenly specific throughout. Upon a reexamination of it, it appears to me to be sufficiently complete and systematic to afford a tolerable material to be cut up, worked over, and amplified into a satisfactory classification of ends. It is in the hope that others may be moved to interest themselves in this work and complete it, or help to complete it, that I now give an improved statement of it.

This statement will be facilitated and made clearer by a notation which is designed to show what the essential elements of the different ends appear to me to be.

586. A. A man may act in a quasi-hypnotic response to an instant command. I indicate this by the letter A.

B. A man may act from obedience, although not to a concrete command. I indicate this by B. In this case, he may still act as purely on the impulse of the moment as in case A. Only if he does so, while still acting from pure obedience, not from any impulse of his own, it must be a Mrs. Grundy, a *vague personification of the community*, which he obeys. I will indicate an end into which such personification enters as an element by a letter *z* following the capital letter.

Is there any way in which a man can act from pure obedience when there is no concrete command without the element *z*? Undoubtedly, provided he acts in obedience to a law. I will indicate that an end involves a conscious reference to a law, or

* c. 1903.

† See vol. 9.

general reason, by writing the figure 1 before the capital letter. We find, then, under B,

Bz Acting under dread of Mrs Grundy, without generalizing her dictum.

1B Acting under awe of a law, without criticizing its obligation.

But cannot the elements 1 and z be combined? Cannot a man act under the influence of a vague personification of the community and yet according to a general rule of conduct? Certainly he so acts when he conforms to custom. Only if it is mere custom and not law, it is not a case of obedience, but of *conformity to norm*, or exemplar. (I never use the word *norm* in the sense of a precept, but only in that of a pattern which is copied, this being the original metaphor.) I indicate an end which presents a norm to be conformed to by the capital letter C

Conformity to a norm may take place by an immediate impulse. It then becomes instinctive imitation. But here the man does not vaguely personify the community, but puts himself in the shoes of another person, as we say. I call this putting of oneself in another's place, *retroconsciousness*. I indicate that an end essentially involves retroconsciousness by writing the letter y after the capital.

Conformity to a norm may also take place without either the y or the z element. Only in this case the norm must be a definite ideal which is regarded as in itself *καλὸς κ'ἀγαθός*. I indicate an end which essentially involves the recognition of a definite ideal as universally and absolutely desirable by putting the figure 2 before the capital. Under C, then, we have the following cases:

Cy Instinctive imitation

1Cz Conformity to custom

2C Conformity to the *καλὸς κ'ἀγαθός*, unanalyzed

587 The elements 1 and y can be combined. That is to say, a man may act from putting himself in another's place and according to a general reason furnished by that retroconsciousness. That is, he acts for the sake of that other's welfare. The object need not be a person: an estate or a plant can be treated with the same affection. But this is no longer conformity to a norm; it is *devotion* to somebody or something.

588. In like manner, the elements 2 and z may be combined. That is to say, a man's ultimate end may lie in a vague personification of the community and at the same time may contemplate a definite general state of things as the *summum bonum*. That is, his heart may be set upon the welfare and safety of the community. But this again is *devotion*, not conformity to a norm. An end the adoption of which involves devotion shall be indicated by the capital letter D.

Devotion may operate in a momentary impulse. In that case, the agent does not put himself in the place of the object, — for that, without reflection, results merely*

589†. All these distinctions would be embraced by some such scheme as the following:

- I. The end is to superinduce upon feeling a certain quality, pleasure.
- II. The end is to extend the existence of a subject.
 1. Of something psychical, as a soul;
 2. Of something physical, as a race.
- III. The end is to realize a general ideal.
 1. To bring about some general state of feeling, such as the greatest pleasure of the greatest number of persons;
 2. To impress a definite subject with a definite character.
 - (a) This character being inward, such as altruistic sentiment;
 - (b) This character being outward, such as the peace and prosperity of mankind.
 3. To further the realization of an ideal not definable in advance, otherwise than as that which tends to realize itself in the long run, or in some such way.
 - (a) This ideal being supposed to be of the inward type;
 - (b) This ideal being supposed to be of the outward type;
 - (c) This ideal being purely methodical, and thus equally capable of inward and of outward realization.

* The manuscript breaks off here.

† 589–590 are from an untitled fragment, c. 1903.

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590 The most serious defect of this classification lies in its subdivision of rationalistic theory into only two main branches splitting upon the insignificant question of whether the end is completely attainable or not. The truth is that there have been three grand classes of rationalistic moralists who have differed from one another upon the much more important question of the mode of being of the end. Namely, there have been those who have made the end purely subjective, a feeling of pleasure, there have been those who have made the end purely objective and material, the multiplication of the race; and finally there have been those who have attributed to the end the same kind of being that a law of nature has, making it lie in the rationalization of the universe.*

* See next chapter and 5 3, 5 433, where Peirce identifies himself with the last group.

CHAPTER 4

IDEALS OF CONDUCT*

591 Every man has certain ideals of the general description of conduct that befits a rational animal in his particular station in life, what most accords with his total nature and relations. If you think this statement too vague, I will say, more specifically, that there are three ways in which these ideals usually recommend themselves and justly do so. In the first place certain kinds of conduct, when the man contemplates them, have an esthetic quality. He thinks that conduct fine; and though his notion may be coarse or sentimental, yet if so, it will alter in time and must tend to be brought into harmony with his nature. At any rate, his taste is his taste for the time being, that is all. In the second place, the man endeavors to shape his ideals into consistency with each other, for inconsistency is odious to him. In the third place, he imagines what the consequences of fully carrying out his ideals would be, and asks himself what the esthetic quality of those consequences would be.

592. These ideals, however, have in the main been imbibed in childhood. Still they have gradually been shaped to his personal nature and to the ideas of his circle of society rather by a continuous process of growth than by any distinct acts of thought. Reflecting upon these ideals, he is led to *intend* to make his own conduct conform at least to a part of them — to that part in which he thoroughly believes. Next, he usually formulates, however vaguely, certain *rules of conduct*. He can hardly help doing so. Besides such rules are convenient and serve to minimize the effects of future inadvertence and, what are well-named, the wiles of the devil within him. Reflection upon these rules, as well as upon the general ideals behind them, has a certain effect upon his disposition, so that what he naturally inclines to do becomes modified. Such being his condition,

* From the "Lowell Lectures of 1903," Lecture I, vol. 1, 3d Draught: 611-615 from vol. 2, 2d Draught, which is a continuation of vol. 1, 3d Draught.

he often foresees that a special occasion is going to arise, thereupon, a certain gathering of his forces will begin to work and this working of his being will cause him to consider how he will act, and in accordance with his disposition, such as it now is, he is led to form a *resolution* as to how he will act upon that occasion. This resolution is of the nature of a plan; or, as one might almost say, a *diagram*. It is a mental formula always more or less general. Being nothing more than an idea, this resolution does not necessarily influence his conduct. But now he sits down and goes through a process similar to that of impressing a lesson upon his memory, the result of which is that the *resolution*, or mental formula, is converted into a *determination*, by which I mean a really efficient agency, such that if one knows what its special character is one can *forecast* the man's conduct on the special occasion. One cannot make forecasts that will come true in the majority of trials of them by means of any figment. It must be by means of something true and real.

tone, I proceed to impress the resolution upon my soul; with the result that when the interview takes place, although my thoughts are then occupied with the matter of the talk, and may never revert to my resolution, nevertheless the determination of my being does influence my conduct. All action in accordance with a determination is accompanied by a feeling that is pleasurable: but, whether the feeling at any instant is felt as pleasurable in that very instant or whether the recognition of it as pleasurable comes a little later is a question of fact difficult to make sure about.

595. The argument turns on the feeling of pleasure, and therefore it is necessary, in order to judge of it, to get at the facts about that feeling as accurately as we can. In beginning to perform any series of acts which had been determined upon beforehand, there is a certain sense of joy, an anticipation and commencement of a relaxation of the tension of need, which we now become more conscious of than we had been before. In the act itself taking place at any instant, it may be that we are conscious of pleasure: although that is doubtful. Before the series of acts are done, we already begin to review them, and in that review we recognize the pleasurable character of the feelings that accompanied those acts.

596. To return to my interview, as soon as it is over I begin to review it more carefully and I then ask myself whether my conduct accorded with my resolution. That resolution, as we agreed, was a mental formula. The memory of my action may be roughly described as an image. I contemplate that image and put the question to myself, Shall I say that that image satisfies the stipulations of my resolution, or not? The answer to this question, like the answer to any inward question, is necessarily of the nature of a mental formula. It is accompanied, however, by a certain quality of feeling which is related to the formula itself very much as the color of the ink in which anything is printed is related to the sense of what is printed. And just as we first become aware of the peculiar color of the ink and afterward ask ourselves whether it is agreeable or not, so in formulating the judgment that the image of our conduct does satisfy our previous resolution we are, in the very act of formulation, aware of a certain quality of *feeling*, the feeling of satisfaction — and directly afterward recognize that that feeling was pleasurable.

597 But now I may probe deeper into my conduct, and may ask myself whether it accorded with my general intentions. Here again there will be a judgment and a feeling accompanying it, and directly afterward a recognition that that feeling was pleasurable or painful. This judgment, if favorable, will probably afford less intense pleasure than the other, but the feeling of satisfaction which is pleasurable will be different and, as we say, a *deeper* feeling.

598 I may now go still further and ask how the image of my conduct accords with my ideals of conduct fitting to a man like me. Here will follow a new judgment with its accompanying feeling followed by a recognition of the pleasurable or painful character of that feeling. In any or all of these ways a man may criticize his own conduct, and it is essential to remark that it is not mere idle praise or blame such as writers who are not of the wisest often distribute among the personages of history. No indeed! It is approval or disapproval of the only respectable kind, that which will bear fruit in the future. Whether the man is satisfied with himself or dissatisfied, his nature will absorb the lesson like a sponge, and the next time he will tend to do better than he did before.

599. In addition to these three self-criticisms of single series of actions, a man will from time to time review his *ideals*. This process is not a job that a man sits down to do and has done with. The experience of life is continually contributing instances more or less illuminative. These are digested first, not in the man's consciousness, but in the depths of his reasonable being. The results come to consciousness later. But meditation seems to agitate a mass of tendencies and allow them more quickly to settle down so as to be really more conformed to what is fit for the man.

600 Finally, in addition to this personal meditation on the fitness of one's own ideals, which is of a practical nature, there are the purely theoretical studies of the student of ethics who seeks to ascertain, as a matter of curiosity, "what the *fitness* of an ideal of conduct consists in, and to deduce from such definition of fitness what conduct ought to be. Opinions differ as to the wholesomeness of this study. It only concerns our present purpose to remark that it is in itself a purely theoretical inquiry, entirely distinct from the business of

shaping one's own conduct. Provided that feature of it be not lost sight of, I myself have no doubt that the study is more or less favorable to right living.

601. I have thus endeavored to describe fully the typical phenomena of controlled action. *They are not every one present in every case.* Thus, as I have already mentioned, there is not always an opportunity to form a resolution. I have specially emphasized the fact that conduct is determined by what precedes it in time, while the recognition of the pleasure it brings follows after the action. Some may opine that this is not true of what is called the pursuit of pleasure, and I admit that there is room for their opinion while I myself incline to think, for example, that the satisfaction of eating a good dinner is never a satisfaction in the present instantaneous state, but always follows after it. I insist, at any rate, that a *feeling*, as a mere appearance, can have no real power in itself to produce any effect whatever, however indirectly.

602. My account of the facts, you will observe, leaves a man at full liberty, no matter if we grant all that the necessitarians ask. That is, the man *can*, or if you please is *compelled*, to *make his life more reasonable*. What other distinct idea than that, I should be glad to know, can be attached to the word liberty?

603. Now let us compare the facts I have stated with the argument I am opposing. That argument rests on two main premisses, first, that it is unthinkable that a man should act from any other motive than pleasure, if his act be deliberate, and second, that action with reference to pleasure leaves no room for any distinction of right and wrong.

604. Let us consider whether this second premiss is really true. What would be requisite in order to destroy the difference between innocent and guilty conduct? The one thing that would do it would be to destroy the faculty of effective self-criticism. As long as that remained, as long as a man compared his conduct with a preconceived standard and that effectively, it need not make much difference if his only *real* motive were pleasure, for it would become disagreeable to him to incur the sting of conscience. But those who deluded themselves with that fallacy were so inattentive to the phenomena

that they confused the judgment, after the act, that that act satisfied or did not satisfy the requirements of a standard, with a pleasure or pain accompanying the act itself.

605. Let us now consider whether the other premiss is true, that it is unthinkable that a man should act deliberately except for the sake of pleasure. What is the element which it is in truth unthinkable that deliberate action should lack? It is simply and solely the determination. Let his determination remain, as it is certainly conceivable that it should remain, although the very nerve of pleasure were cut so that the man were perfectly insensible to pleasure and pain, and he will certainly pursue the line of conduct upon which he is intent. The only effect would be to render the man's intentions more inflexible — an effect, by the way, which we often have occasion to observe in men whose feelings are almost deadened by age or by some derangement of the brain. But those who have reasoned in this fallacious way have confounded together the determination of the man's nature, which is an efficient agency prepared previously to the act, with the comparison of conduct with a standard, which comparison is a general mental formula subsequent to the act, and, having identified these two utterly different things, placed them in the act itself as a mere quality of feeling.

606. Now if we recur to the defendant argument about reasoning, we shall find that it involves the same sort of tangle of ideas. The phenomena of reasoning are, in their general features, parallel to those of moral conduct. For reasoning is essentially thought that is under self-control, just as moral conduct is conduct under self-control. Indeed reasoning is a species of controlled conduct and as such necessarily partakes of the essential features of controlled conduct. If you attend to the phenomena of reasoning, although they are not quite so familiar to you as those of morals because there are no clergymen whose business it is to keep them before your minds, you will nevertheless remark, without difficulty, that a person who draws a rational conclusion, not only thinks it to be true, but thinks that similar reasoning would be just in every analogous case. If he fails to think this, the inference is not to be called reasoning. It is merely an idea suggested to his mind and which he cannot resist thinking is true. But not having been sub-

jected to any check or control, it is not deliberately approved and is not to be called reasoning. To call it so would be to ignore a distinction which it ill becomes a rational being to overlook. To be sure, every inference forces itself upon us irresistibly. That is to say, it is irresistible at the instant it first suggests itself. Nevertheless, we all have in our minds certain *norms*, or general patterns of right reasoning, and we can compare the inference with one of those and ask ourselves whether it satisfies that rule. I call it a rule, although the formulation may be somewhat vague; because it has the essential character of a rule of being a general formula applicable to particular cases. If we judge our norm of right reason to be satisfied, we get a feeling of approval, and the inference now not only appears as irresistible as it did before, but it will prove far more unshakable by any doubt.

607. You see at once that we have here all the main elements of moral conduct, the general standard mentally conceived beforehand, the efficient agency in the inward nature, the act, the subsequent comparison of the act with the standard. Examining the phenomena more closely we shall find that not a single element of moral conduct is unrepresented in reasoning. At the same time, the special case naturally has its peculiarities.

608. Thus, we have a general ideal of sound logic. But we should not naturally describe it as our idea of the kind of reasoning that befits men in our situation. How should we describe it? How if we were to say that sound reasoning is such reasoning that in every conceivable state of the universe in which the facts stated in the premisses are true, the fact stated in the conclusion will thereby and therein be true. The objection to this statement is that it only covers necessary reasoning, including reasoning about chances. There is other reasoning which is defensible as probable, in the sense that while the conclusion may be more or less erroneous, yet the same procedure diligently persisted in must, in every conceivable universe in which it leads to any result at all, lead to a result indefinitely approximating to the truth. When that is the case, we shall do right to pursue that method, provided we recognize its true character, since our relation to the universe does not permit us to have any necessary knowledge of

positive facts. You will observe that in such a case our ideal is shaped by the consideration of our situation relatively to the universe of existences. There are still other operations of the mind to which the name "reasoning" is especially appropriate, although it is not the prevailing habit of speech to call them so. They are conjectures, but rational conjectures; and the justification of them is that unless a man had a tendency to guess right, unless his guesses are better than tossing up a copper, no truth that he does not already virtually possess could ever be disclosed to him, so that he might as well give up all attempt to reason, while if he has any decided tendency to guess right, as he *may* have, then no matter how often he guesses wrong, he will get at the truth at last. These considerations certainly do take into account the man's inward nature as well as his outward relations, so that the ideals of good logic are truly of the same general nature as ideals of fine conduct. We saw that three kinds of considerations go to support ideals of conduct. They were, first, that certain conduct seems fine in itself. Just so certain conjectures seem likely and easy in themselves. Secondly, we wish our conduct to be consistent. Just so the ideal [of] necessary reasoning is consistency simply. Third, we consider what the general effect would be of thoroughly carrying out our ideals. Just so certain ways of reasoning recommend themselves because if persistently carried out they must lead to the truth. The parallelism, you perceive, is almost exact.

609 There is also such a thing as a general logical *intention*. But it is not emphasized for the reason that the will does not enter so violently into reasoning as it does into moral conduct. I have already mentioned the logical norms, which correspond to moral laws. In taking up any difficult problem of reasoning we formulate to ourselves a logical resolution, but here again, because the will is not at such high tension in reasoning as it often is in self-controlled conduct, these resolutions are not very prominent phenomena. Owing to this circumstance, the efficient determination of our nature, which causes us to reason in each case as we do, has less relation to resolutions than to logical norms. The act itself is, at the instant, irresistible in both cases. But immediately after, it is subjected to self-criticism by comparison with a previous

standard which is always the norm, or *rule*, in the case of reasoning, although in the case of outward conduct we are too often content to compare the act with the resolution. In the case of general conduct, the lesson of satisfaction or dissatisfaction is frequently not much taken to heart and little influences future conduct. But in the case of reasoning an inference which self-criticism disapproves is always instantly annulled, because there is no difficulty in doing this. Finally, all the different feelings which, as we noticed, accompanied the different operations of self-controlled conduct equally accompany those of reasoning, although they are not quite so vivid.

610 The parallelism is thus perfect. Nor, I repeat, could it fail to be so, if our description of the phenomena of controlled conduct was true, since reasoning is only a special kind of controlled conduct . . .

611. What does right reasoning consist in? It consists in such reasoning as shall be conducive to our ultimate aim. What, then, is our ultimate aim? Perhaps it is not necessary that the logician should answer this question. Perhaps it might be possible to deduce the correct rules of reasoning from the mere assumption that we have some ultimate aim. But I cannot see how this could be done. If we had, for example, no other aim than the pleasure of the moment, we should fall back into the same absence of any logic that the fallacious argument would lead to. We should have no ideal of reasoning, and consequently no norm. It seems to me that the logician ought to recognize what our ultimate aim is. It would seem to be the business of the moralist to find this out, and that the logician has to accept the teaching of ethics in this regard. But the moralist, as far as I can make it out, merely tells us that we have a power of self-control, that no narrow or selfish aim can ever prove satisfactory, that the only satisfactory aim is the broadest, highest, and most general possible aim, and for any more definite information, as I conceive the matter, he has to refer us to the esthetician, whose business it is to say what is the state of things which is most admirable in itself regardless of any ulterior reason.

612 So, then, we appeal to the esthete to tell us what it is that is admirable without any reason for being admirable beyond its inherent character. Why, that, he replies, is the

beautiful Yes, we urge, such is the name that you give to it, but what *is it*? What is this character? If he replies that it consists in a certain quality of feeling, a certain *bliss*, I for one decline altogether to accept the answer as sufficient. I should say to him, My dear Sir, if you can prove to me that this quality of feeling that you speak of does, as a fact, attach to what you call the beautiful, or that which would be admirable without any reason for being so, I am willing enough to believe you, but I cannot without strenuous proof admit that any particular quality of feeling is admirable without a reason. For it is too revolting to be believed unless one is forced to believe it.

613 A fundamental question like this, however practical the issues of it may be, differs entirely from any ordinary practical question, in that whatever is accepted as good in itself must be accepted without compromise. In deciding any special question of conduct it is often quite right to allow weight to different conflicting considerations and calculate their resultant. But it is quite different in regard to that which is to be the aim of all endeavor. The object admirable that is admirable *per se* must, no doubt, be general. Every ideal is more or less general. It may be a complicated state of things. But it must be a *single* ideal, it must have *unity*, because it is an idea, and unity is essential to every idea and every ideal. Objects of utterly disparate kinds may, no doubt, be admirable, because some special reason may make each one of them so. But when it comes to the ideal of the admirable, in itself, the very nature of its being is to be a precise idea, and if somebody tells me it is either this, or that, or that other, I say to him, It is clear you have no *idea* of what precisely it is. But an ideal must be capable of being embraced in a unitary idea, or it is no ideal at all. Therefore, there can be no compromises between different considerations here. The admirable ideal cannot be too extremely admirable. The more thoroughly it has whatever character is essential to it, the more admirable it must be.

614 Now what would the doctrine that that which is admirable in itself is a quality of feeling come to if taken in all its purity and carried to its furthest extreme — which should be the extreme of admirableness? It would amount to

ideas always involves conditional predictions or requires for its fulfillment that events should come to pass, and all that ever can have come to pass must fall short of completely fulfilling its requirements. A little example will serve to illustrate what I am saying. Take any general term whatever. I say of a stone that it is *hard*. That means that so long as the stone remains hard, every essay to scratch it by the moderate pressure of a knife will surely fail. To call the stone *hard* is to predict that no matter how often you try the experiment, it will fail every time. That innumerable series of conditional predictions is involved in the meaning of this lowly adjective. Whatever may have been done will not begin to exhaust its meaning. At the same time, the very being of the General, of Reason, is of such a mode that this being *consists* in the Reason's actually governing events. Suppose a piece of carborundum has been made and has subsequently been dissolved in aqua regia without anybody at any time, so far as I know, ever having tried to scratch it with a knife. Undoubtedly, I may have good reason, nevertheless, to call it hard, because some actual fact has occurred such that Reason compels me to call it so, and a general idea of all the facts of the case can only be formed if I do call it so. In this case, my calling it hard is an actual event which is governed by that law of hardness of the piece of carborundum. But if there were no actual fact whatsoever which was meant by saying that the piece of carborundum was hard, there would be not the slightest meaning in the word hard as applied to it. The very being of the General, of Reason, *consists* in its governing individual events. So, then, the essence of Reason is such that its being never can have been completely perfected. It always must be in a state of incipency, of growth. It is like the character of a man which consists in the ideas that he will conceive and in the efforts that he will make, and which only develops as the occasions actually arise. Yet in all his life long no son of Adam has ever fully manifested what there was in him. So, then, the development of Reason requires as a part of it the occurrence of more individual events than ever can occur. It requires, too, all the coloring of all qualities of feeling, including pleasure in its proper place among the rest. This development of Reason consists, you will observe, in embodiment, that is in manifestation. The creation of the

universe, which did not take place during a certain long task, in the year 4001 B.C., but is going on today and ever will be done, is this very development of Reason. I do not suppose one can have a more satisfying ideal of the admirable than this development of Reason so understood. The one thing whose admirableness is not due to an ulterior reason is Reason itself comprehended in all its fullness. *—* *offer a reason to respect and it* Under this conception, the ideal of conduct will be to execute our little function in the operation of the creation by giving a hand toward rendering the world more reasonable whenever, as the slang is, it is "up to us" to do so. In logic, it will be observed that knowledge is reasonable, and the ideal of reasoning will be to follow each method that must develop knowledge the most perfectly.

CHAPTER 5

VITALLY IMPORTANT TOPICS

§1. THEORY AND PRACTICE*

616. The early Greek philosopher, such as we read about in Diogenes Laertius, is certainly one of the most amusing curiosities of the whole human menagerie. It seems to have been demanded of him that his conduct should be in marked contrast with the dictates of ordinary common sense. Had he behaved as other men are supposed to do his fellow-citizens would have thought his philosophy had not taught him much. I know that historians possessed of "higher criticism" deny all the ridiculous anecdotes about the Hellenic sages. These scholars seem to think that logic is a question of literary taste, and their refined perceptions refuse to accept these narratives. But in truth even were taste carried to a point of delicacy exceeding that of the German professor — which he would think was pushing it quite into that realm of imaginary quantities which lies on the other side of infinity — it still would not weigh as logic, which is a matter of strict mathematical demonstration wherein opinion is of no weight at all.

617. Now scientific logic cannot approve that historical method which leads to the absolute and confident denial of all the positive testimony that is extant, the moment that testimony deviates from the preconceived ideas of the historian. The story about Thales falling into the ditch while pointing out the different stars to the old woman is told by Plato† about two centuries later. But Dr. Edouard Zeller‡ says he knows better, and pronounces the occurrence quite impossible. Were you to point out that the anecdote only attributes to Thales a character common to almost all mathematicians, this would afford him a new opportunity of applying his

* The first lecture on "Detached Ideas on Vitally Important Topics," of 1898. It is entitled "Philosophy and the Conduct of Life."

† Theaetetus 174A.

‡ *Die Philosophie der Griechen*, etc. 5 Aufl. 1 Teil (1892) S. 183n.

favorite argument of objection, that the story is "too probable." So the assertion of half a dozen clever writers that Democritus was always laughing and Heraclitus always weeping "proclaims itself," says Zeller, "an idle fabrication,"* notwithstanding the support it receives from the fragment. Even Zeller admits that Diogenes of Sinope was a truly eccentric. Being a contemporary of Aristotle and one of the best known men of Greece, his history cannot well be denied even by Zeller, who has to content himself with averring that the stories are "grossly exaggerated."† There was no other philosopher whose conduct according to all testimony was quite so extravagant as that of Pyrrho. The account of him seems to come direct from a writing of his devoted pupil, Titiro of Phlius, and some of our authorities, of whom there are a dozen, profess to use this book. Yet Zeller and the critics do not believe them, and Brandis objects that the citizens of Elis would not have chosen a half-insane man high priest — as if symptoms of that kind would not have particularly recommended him for a divine office. That fashion of writing history is, I hope, now at last passing away.

618 However, disbelieve the stories if you will, you cannot refuse to admit that they show what kind of men the narrators expected a philosopher to be — if they were imaginary legends, all the more so. Now those narrators are a cloud of the sanest and soberest minds of antiquity — Plato, Aristotle, Cicero, Seneca, Pliny, Plutarch, Lucian, Elian, and so forth. The Greeks expected philosophy to affect life — not by any slow process of percolation of forms, as we may expect that researches into differential equations, stellar photometry, the taxonomy of echinoderms, and the like will ultimately affect the conduct of life — but forthwith in the person and soul of the philosopher himself, rendering him different from ordinary men in his views of right conduct. So little did they separate philosophy from esthetic and moral culture that the *doctus furor arduus Lucretii* could clothe an elaborate *cosmogony* in noble verse, for the express purpose of influencing men's lives, and Plato tells us in many places how inextricably he considers the study of Dialectic to be bound up with virtuous

* Ib S 626n and S 845n

† Ib 4 Auf 2 Teil 1 Abt (1889) S 283n

living. Aristotle, on the other hand, set this matter right. Aristotle was not much of a Greek. That he was of full Greek blood is not likely. That he was not altogether a Greek-minded man is manifest. Though he belonged to the school of Plato, yet when he went there he was already a student, perhaps a personal pupil, of Democritus, himself another Thracian; and during his first years in Athens he cannot have had much intercourse with Plato, who was away at Syracuse a large part of the time. Above all Aristotle was an Asclepiades, that is to say, he belonged to a line every man of whom since the heroic age had, as a child, received a finished training in the dissecting-room. Aristotle was a thorough-paced scientific man such as we see nowadays, except for this, that he ranged over all knowledge. As a man of scientific instinct, he classed metaphysics, in which I doubt not he included logic, as a matter of course, among the sciences — sciences in *our* sense, I mean, what *he* called theoretical sciences — along with mathematics and natural science — natural science embracing what we call the physical sciences and the psychical sciences, generally. This theoretical science was for him one thing, animated by one spirit and having knowledge of theory as its ultimate end and aim. Esthetic studies were of a radically different kind, while morals, and all that relates to the conduct of life, formed a *third* department of intellectual activity, radically foreign in its nature and idea, from both the other two. Now, Gentlemen, it behooves me, at the outset of this course, to confess to you that in this respect I stand before you an Aristotelian and a scientific man, condemning with the whole strength of conviction the Hellenic tendency to mingle philosophy and practice.

619 There are sciences, of course, many of whose results are almost immediately applicable to human life, such as physiology and chemistry. But the true scientific investigator completely loses sight of the utility of what he is about. It never enters his mind. Do you think that the physiologist who cuts up a dog reflects, while doing so, that he may be saving a human life? Nonsense. If he did, it would spoil him for a scientific man, and then the vivisection would become a crime. However, in physiology and in chemistry, the man whose brain is occupied with utilities, though he will not do

much for science, may do a great deal for human life. But in philosophy, touching as it does upon matters which are, and ought to be, sacred to us the investigator who does not stand aloof from all intent to make practical applications will not only obstruct the advance of the pure science, but, what is infinitely worse, he will endanger his own moral integrity and that of his readers

620 In my opinion, the present infantile condition of philosophy — for as long as earnest and industrious students of it are able to come to agreement upon scarce a single principle, I do not see how it can be considered as otherwise than in its infancy — is due to the fact that during this century it has chiefly been pursued by men who have not been nurtured in dissecting-rooms and other laboratories, and who consequently have not been animated by the true scientific *Eros*; but who have on the contrary come from theological seminaries, and have consequently been inflamed with a desire to amend the lives of themselves and others, a spirit no doubt more important than the love of science, for men in average situations, but radically unfitting them for the task of scientific investigation. And it is precisely because of this utterly unsettled and uncertain condition of philosophy at present, that I regard any practical applications of it to religion and conduct as exceedingly dangerous. I have not one word to say against the philosophy of religion or of ethics in general or in particular. I only say that for the present it is all far too dubious to warrant risking any human life upon it. I do not say that philosophical science should not ultimately influence religion and morality. I only say that it should be allowed to do so only with secular slowness and the most conservative caution.

621. Now I may be utterly wrong in all this, and I do not propose to argue the question. I do not ask you to go with me. But to avoid any possible misapprehension, I am bound honestly to declare that I do not hold forth the slightest promise that I have any philosophical wares to offer you which will make you either better men or more successful men.

622. It is particularly needful that I should say this owing to a singular hybrid character which you will detect in these lectures. I was asked in December to prepare a course of lectures upon my views of philosophy. I accordingly set to work

to draw up in eight lectures an outline of one branch of philosophy, namely, Objective Logic * But just as I was finishing one lecture word came that you would expect to be addressed on topics of vital importance, and that it would be as well to make the lectures detached I thereupon threw aside what I had written and began again to prepare the same number of homilies on intellectual ethics and economics They were wretched things, and I was glad enough to learn, when three-quarters of my task was done, that it would be desirable that as much as possible should be said of certain philosophical questions, other subjects being put in the background At that time, however, it was too late to write a course which should set before you what I should have greatly desired to submit to your judgment I could only patch up some fragments partly philosophical and partly practical Thus, you will find me part of the time offering you detached ideas upon topics of vital importance, while part of the time I shall be presenting philosophical considerations, in which you will be able to feel an undercurrent toward that logic of things concerning which I shall have an opportunity to interject scarce one overt word

623 I shall have a good deal to say about right reasoning, and in default of better I had reckoned *that* as a topic of vital importance But I do not know that the theory of reasoning is quite vitally important That it is absolutely essential in metaphysics, I am as sure as I am of any truth of philosophy. But in the conduct of life, we have to distinguish everyday affairs and great crises In the great decisions, I do not believe it is safe to trust to individual reason In everyday business, reasoning is tolerably successful, but I am inclined to think that it is done as well without the aid of theory as with it A *logica utens*, like the analytical mechanics resident in the billiard player's nerves, best fulfills familiar uses

624 In metaphysics, however, it is not so, at all, and the reason is obvious The truths that the metaphysician infers can be brought to the test of experience, if at all only in a department of experience quite foreign from that which furnishes his premisses Thus a metaphysician who infers anything about a life beyond the grave can never find out for

* See vol 6, bl. I, ch 7, §2

certain that his inference is false until he has gone out of the metaphysical business, at his present stand, at least. The consequence is that unless the metaphysician is a most thorough master of formal logic — and especially of the inductive side of the logic of relatives, immeasurably more important and difficult than all the rest of formal logic put together — he will inevitably fall into the practice of deciding upon the validity of reasonings in the same manner in which, for example, the practical politician decides as to the weight that ought to be allowed to different considerations, that is to say, by the impression those reasonings make upon the mind, only with this stupendous difference, that the one man's impressions are the resultant of long experiential training, while with such training the other man is altogether unacquainted. The metaphysician who adopts a metaphysical reasoning because he is impressed that it is sound, might just as well, or better, adopt his conclusions directly because he is impressed that they are true, in the good old style of Descartes and of Plato. To convince yourself of the extent to which this way of working actually vitiates philosophy, just look at the dealings of the metaphysicians with Zeno's objections to motion. They are simply at the mercy of the adroit Italian. For this reason, then, if for no other, the metaphysician who is not prepared to grapple with all the difficulties of modern exact logic had better put up his shutters and go out of the trade. Unless he will do one or the other, I tell him to his conscience that he is not the genuine, honest, earnest, resolute, energetic, industrious, and accomplished doubter that it is his duty to be.

625. But this is not all, nor half. For after all, metaphysical reasonings, such as they have hitherto been, have been simple enough for the most part. It is the metaphysical concepts which it is difficult to apprehend. Now the metaphysical conceptions, as I need not waste words to show, are merely adapted from those of formal logic, and therefore can only be apprehended in the light of a minutely accurate and thorough-going system of formal logic.

626. But in practical affairs, in matters of vital importance, it is very easy to exaggerate the importance of ratiocination. Man is so vain of his power of reason! It seems impossible for him to see himself in this respect, as he himself would see

himself if he could duplicate himself and observe himself with a critical eye Those whom we are so fond of referring to as the "lower animals" reason very little Now I beg you to observe that those beings very rarely commit a *mistake*, while we — ' We employ twelve good men and true to decide a question, we lay the facts before them with the greatest care, the "perfection of human reason" presides over the presentment, they hear, they go out and deliberate, they come to a unanimous opinion, and it is generally admitted that the parties to the suit might almost as well have tossed up a penny to decide! Such is man's glory!

627 The mental qualities we most admire in all human beings except our several selves are the maiden's delicacy, the mother's devotion, manly courage, and other inheritances that have come to us from the biped who did not yet speak, while the characters that are most contemptible take their origin in reasoning The very fact that everybody so ridiculously overrates his own reasoning is sufficient to show how superficial the faculty is For you do not hear the courageous man vaunt his own courage, or the modest woman boast of her modesty, or the really loyal plume themselves on their honesty What they are vain about is always some insignificant gift of beauty or of skill

628. It is the instincts, the sentiments, that make the substance of the soul Cognition is only its surface, its locus of contact with what is external to it

629 Do you ask me to prove this? If so, you must be a rationalist, indeed I can prove it — but only by assuming a logical principle of the demonstration of which I shall give a hint in the next lecture * When people ask me to prove a proposition in philosophy I am often obliged to reply that it is a corollary from the logic of relatives Then certain men say, "I should like exceedingly to look into this logic of relatives, you must write out an exposition of it " The next day I bring them a manuscript But when they see that it is full of A, B, and C, they never look at it again Such men — oh, well.

630 Reasoning is of three kinds The first is necessary, but it only professes to give us information concerning the matter of our own hypotheses and distinctly declares that, if

* See "Introduction," vol 4

we want to know anything else, we must go elsewhere. The second depends upon probabilities. The only cases in which it pretends to be of value is where we have, like an insurance company, an endless multitude of insignificant risks. Wherever a vital interest is at stake, it clearly says, "Don't ask me." The third kind of reasoning tries what *il lume naturale*, which lit the footsteps of Galileo, can do. It is really an appeal to instinct. Thus reason, for all the frills it customarily wears, in vital crises, comes down upon its marrow-bones to beg the succour of instinct.

631. Reason is of its very essence egotistical. In many matters it acts the fly on the wheel. Do not doubt that the bee thinks it has a good reason for making the end of its cell as it does. But I should be very much surprised to learn that its reason had solved that problem of isoperimetry that its instinct has solved. Men many times fancy that they act from reason when, in point of fact, the reasons they attribute to themselves are nothing but excuses which unconscious instinct invents to satisfy the teasing "whys" of the *ego*. The extent of this self-delusion is such as to render philosophical rationalism a farce.

632. Reason, then, appeals to sentiment in the last resort. Sentiment on its side feels itself to be the man. That is my simple apology for philosophical sentimentalism.

633. Sentimentalism implies conservatism, and it is of the essence of conservatism to refuse to push any practical principle to its extreme limits — including the principle of conservatism itself. We do not say that sentiment is *never* to be influenced by reason, nor that under no circumstances would we advocate radical reforms. We only say that the man who would allow his religious life to be wounded by any sudden acceptance of a philosophy of religion or who would precipitately change his code of morals at the dictate of a philosophy of ethics — who would, let us say, hastily practice incest — is a man whom we should consider *unwise*. The regnant system of sexual rules is an instinctive or sentimental induction summarizing the experience of all our race. That it is abstractly and absolutely infallible we do not pretend, but that it is practically infallible for the individual — which is the only clear sense the word "infallibility" will bear — in that he ought to

obey it and not his individual reason, *that* we do maintain.

634 I would not allow to sentiment or instinct any weight whatsoever in theoretical matters, not the slightest. Right sentiment does not demand any such weight, and right reason would emphatically repudiate the claim if it were made. True, we are driven oftentimes in science to try the suggestions of instinct; but we only *try* them, we compare them with experience, we hold ourselves ready to throw them overboard at a moment's notice from experience. If I allow the supremacy of sentiment in human affairs, I do so at the dictation of reason itself, and equally at the dictation of sentiment, in theoretical matters I refuse to allow sentiment any weight whatever.

635 Hence, I hold that what is properly and usually called *belief*, that is, the adoption of a proposition as a *κτῆμα ἐς ἀεί* to use the energetic phrase of Doctor Carus,* has no place in science at all. We *believe* the proposition we are ready to act upon. *Full belief* is willingness to act upon the proposition in vital crises, *opinion* is willingness to act upon it in relatively insignificant affairs. But pure science has nothing at all to do with *action*. The propositions it accepts, it merely writes in the list of premisses it proposes to use. Nothing is *vital* for science, nothing can be. Its accepted propositions, therefore, are but opinions at most, and the whole list is provisional. The scientific man is not in the least wedded to his conclusions. He risks nothing upon them. He stands ready to abandon one or all as soon as experience opposes them. Some of them, I grant, he is in the habit of calling *established truths*, but that merely means propositions to which no competent man today demurs. It seems probable that any given proposition of that sort will remain for a long time upon the list of propositions to be admitted. Still, it may be refuted tomorrow; and if so, the scientific man will be glad to have got rid of an error. There is thus no proposition at all in science which answers to the conception of belief.

636 But in vital matters, it is quite otherwise. We must act in such matters, and the principle upon which we are willing to act is a *belief*.

637. Thus, pure theoretical knowledge, or science, has nothing directly to say concerning practical matters, and noth-

* *Fundamental Problems*, Open Court, Chicago (1891), p. 22

ing even applicable at all to vital crises. Theory is applicable to minor practical affairs, but matters of vital importance must be left to sentiment, that is, to instinct

638. Now there are two conceivable ways in which right sentiment might treat such terrible crises; on the one hand, it might be that while human instincts are not so detailed and featured as those of the dumb animals, yet they might be sufficient to guide us in the *greatest* concerns without any aid from reason, while on the other hand, sentiment might act to bring the vital crises under the domain of reason by rising under such circumstances to such a height of self-abnegation as to render the situation insignificant. In point of fact, we observe that a healthy natural human nature does act in both these ways

639. The instincts of those animals whose instincts are remarkable present the character of being chiefly, if not altogether, directed to the preservation of the stock and of benefiting the individual very little, if at all, except so far as he may happen as a possible procreator to be a potential public functionary. Such, therefore, is the description of instinct that we ought to expect to find in man, in regard to vital matters; and so we do. It is not necessary to enumerate the facts of human life which show this because it is too plain. It is to be remarked, however, that individuals who have passed the reproductive period, are more useful to the propagation of the human race than to [?] any other. For they amass wealth, and teach prudence, they keep the peace, they are friends of the little ones, and they inculcate all the sexual duties and virtues. Such instinct does, as a matter of course, prompt us, in all vital crises, to look upon our individual lives as small matters. It is no extraordinary pitch of virtue to do so, it is the character of every man or woman that is not despicable. Somebody during the Reign of Terror said: *Tout le monde croit qu'il est difficile de mourir Je le crois comme les autres. Cependant je vois que quant on est là chacun s'en tire.* It is less characteristic of the woman because her life is more important to the stock, and her immolation less useful.

640. Having thus shown how much less vitally important reason is than instinct. I next desire to point out how exceedingly desirable, not to say indispensable, it is for the successful

march of discovery in philosophy and in science generally that practical utilities, whether low or high, should be *put out of sight* by the investigator.

641 The point of view of utility is always a narrow point of view. How much more we should know of chemistry today if the most practically important bodies had not received excessive attention, and how much *less* we should know, if the rare elements and the compounds which only exist at low temperatures had received only the *share* of attention to which their *utility* entitled them.

642 It is notoriously true that into whatever you do not put your whole heart and soul in that you will not have much success. Now, the two masters, *theory* and *practice*, you cannot serve. That perfect balance of attention which is requisite for observing the system of things is utterly lost if human desires intervene, and all the more so the higher and holier those desires may be.

643 In addition to that, in philosophy we have prejudices so potent that it is impossible to keep one's *sang-froid* if we allow ourselves to dwell upon them at all.

644 It is far better to let philosophy follow perfectly untrammelled a scientific method, *predetermined* in advance of knowing to what it will lead. If that course be honestly and scrupulously carried out, the results reached, even if they be not altogether true, even if they be grossly mistaken, can not but be highly serviceable for the ultimate discovery of truth. Meantime, sentiment can say "Oh well, philosophical science has not by any means said its last word yet, and meantime I will continue to believe *so and so*."

645 No doubt a large proportion of those who now busy themselves with philosophy will lose all interest in it as soon as it is forbidden to look upon it as susceptible of practical applications. We who continue to pursue the theory must bid *adieu* to them. But so we must in any department of pure science. And though we regret to lose their company, it is infinitely better that men devoid of genuine scientific curiosity should not barricade the road of science with empty books and embarrassing assumptions.

646 The host of men who achieve the bulk of each year's new discoveries are mostly confined to narrow ranges. For

that reason you would expect the arbitrary hypotheses of the different mathematicians to shoot out in every direction into the boundless void of arbitrariness. But you do not find any such thing. On the contrary, what you find is that men working in fields as remote from one another as the African diamond fields are from the Klondike reproduce the same forms of novel hypothesis. Riemann had apparently never heard of his contemporary Listing. The latter was a naturalistic geometer, occupied with the shapes of leaves and birds' nests, while the former was working upon analytical functions. And yet that which seems the most arbitrary in the ideas created by the two men are one and the same form. This phenomenon is not an isolated one, it characterizes the mathematics of our times, as is, indeed, well known. All this crowd of creators of forms for which the real world affords no parallel, each man arbitrarily following his own sweet will, are, as we now begin to discern, gradually uncovering one great cosmos of forms, a world of potential being. The pure mathematician himself feels that this is so. He is not indeed in the habit of publishing any of his sentiments nor even his generalizations. The fashion in mathematics is to print nothing but demonstrations, and the reader is left to divine the workings of the man's mind from the sequence of those demonstrations. But if you enjoy the good fortune of talking with a number of mathematicians of a high order, you will find that the typical pure mathematician is a sort of Platonist. Only, he is [a] Platonist who corrects the Heraclitan error that the eternal is not continuous. The eternal is for him a world, a cosmos, in which the universe of actual existence is nothing but an arbitrary locus. The end that pure mathematics is pursuing is to discover that real potential world.

647. Once you become inflated with that idea, *vital importance* seems to be a very low kind of importance, indeed.

But such ideas are only suitable to regulate another life than this. Here we are in this workaday world, little creatures, mere cells in a social organism itself a poor and little thing enough, and we must look to see what little and definite task our circumstances have set before our little strength to do. The performance of that task will require us to draw upon all our powers, reason included. And in the doing of it we should

chiefly depend not upon that department of the soul which is most superficial and fallible — I mean our reason — but upon that department that is deep and sure — which is instinct.

648. Instinct is capable of developement and growth — though by a movement which is slow in the proportion in which it is vital; and this developement takes place upon lines which are altogether parallel to those of reasoning. And just as reasoning springs from experience, so the developement of sentiment arises from the soul's Inward and Outward Experiences. Not only is it of the same nature as the developement of cognition, but it chiefly takes place through the instrumentality of cognition. The soul's deeper parts can only be reached through its surface. In this way the eternal forms, that mathematics and philosophy and the other sciences make us acquainted with, will by slow percolation gradually reach the very core of one's being; and will come to influence our lives, and this they will do, not because they involve truths of merely vital importance, but because they are ideal and eternal verities.

§2. PRACTICAL CONCEPTS AND THE WISDOM OF SENTIMENT*

reasoning whatever involves mathematics, and laugh over the fallacies of those who attempt to reason unmathematically. Now tell me, is mathematics an occupation for a gentleman and an athlete? Is not such drudgery fit only for the lower classes? One may well be struck with pity for the masses of population concentrated in New York and living under such unnatural conditions that they are forced to think mathematically. However, it is not as if they had the tender nurture of a cultured modern Harvard, that great eleemosynary institution that Massachusetts has established to the end that the *élite* of her youths may be aided to earning comfortable incomes and living softly cultured lives. The brains of those New York plebeians are coarse, strong, laboring brains, that don't know what it is to be free from mathematics. Their conceptions are crude and vulgar enough, but their vigor of reasoning would surprise you. I have seen my [private] scholars there wrestle with problems that I would no more venture to allow the exquisitely polished intellects of a modern university to attack than I would venture to toss a cannonball into an eggshell cup.

651. I intend to call upon you for no reasoning in these lectures more complicated than one of Hegel's dilemmas. For all reasoning is mathematical and requires effort; and I mean to shun the guilt of overstraining anybody's powers. That is why I have selected a subject for my lectures which is not at all in my line, but which I hope may prove to be to your taste.

652 On vitally important topics reasoning is out of place. . . . The very theory of reasoning, were we resolutely to attack it without any dread of mathematics, would furnish us conclusive reasons for limiting the applicability of reasoning to unimportant matters; so that, unless a problem is insignificant in importance compared with the aggregate of analogous problems, reasoning itself pronounces that there is a fallacy in submitting the question to reason, at all. That must remain merely an assertion, mathematics being *taboo*. . . .

653. In regard to the greatest affairs of life, the wise man follows his heart and does not trust his head. This should be the method of every man, no matter how powerful his intellect. More so still, perhaps, if mathematics is too difficult for him, that is to say, if he is unequal to any intricate reasoning whatsoever. Would not a man physically puny be a fool not to

recognize it, and to allow an insane megalomania to induce him to enter a match game of football? But the slightest of physical frames might as well attempt to force back a locomotive engine, as for the mightiest of mental giants to try to regulate his life advantageously by a purely reasoned-out theory.

654 Common sense, which is the resultant of the traditional experience of mankind, witnesses unequivocally that the heart is more than the head, and is in fact everything in our highest concerns, thus agreeing with my unproved logical theorem, and those persons who think that sentiment has no part in common sense forget that the dicta of common sense are objective facts, not the way some dyspeptic may feel, but what the healthy, natural, normal democracy thinks. And yet when you open the next new book on the philosophy of religion that comes out, the chances are that it will be written by an intellectualist who in his preface offers you his metaphysics as a guide for the soul, talking as if philosophy were one of our deepest concerns. How can the writer so deceive himself?

655 If, walking in a garden on a dark night, you were suddenly to hear the voice of your sister crying to you to rescue her from a villain, would you stop to reason out the metaphysical question of whether it were possible for one mind to cause material waves of sound and for another mind to perceive them? If you did, the problem might probably occupy the remainder of your days. In the same way, if a man undergoes any religious experience and hears the call of his Saviour, for him to halt till he has adjusted a philosophical difficulty would seem to be an analogous sort of thing, whether you call it stupid or whether you call it disgusting. If on the other hand, a man has had no religious experience, then any religion not an affectation is as yet impossible for him, and the only worthy course is to wait quietly till such experience comes. No amount of speculation can take the place of experience.

656 Pray pardon my hopping about from one branch of my discourse to another and back again with no more apparent purpose than a robin redbreast or a Charles Lamb. Because it would hardly be logically consistent for me to arrange my matter with scrupulously logical accuracy when the very thing I am driving at is that logic and reasoning are only of secondary importance. There are two psychological or anthropological

observations about our reasoning powers which it is convenient to insert here.

657. One is that powers of reasoning in any but the most rudimentary way are a somewhat uncommon gift, about as uncommon as a talent for music. Indeed, a much smaller number of persons actually attain to any proficiency in reasoning. But then the exercise of intricate ratiocination requires great energy and prolonged effort, while musical practice is nearly unmixed pleasure, I suppose, for those who do it well. Moreover, owing to several peculiar circumstances, good instruction in reasoning is exceedingly rare. As for what is taught in the colleges under the name of logic, oh dear, perhaps the less said the better. It is true that mathematics teaches one branch of reasoning. That is, indeed, its chief value in education. But how few teachers understand the logic of mathematics! And how few understand the psychology of the puzzled pupil! The pupil meets with a difficulty in Euclid. Two to one the reason is that there is a logical flaw. The boy, however, is conscious only of a mysterious hindrance. What his difficulty is he cannot tell the teacher, the teacher must teach him. Now the teacher probably never really saw the true logic of the passage. But he thinks he does because, owing to long familiarity, he has lost that sense of coming up against an invisible barrier that the boy feels. Had the teacher ever really conquered the logical difficulty himself, of course he would recognize just what it was, and thus would fulfill the first condition, at least, of being helpful. But not having conquered the difficulty, but only having worn out the sense of difficulty by familiarity, he simply cannot understand why the boy should feel any difficulty; and all he can do is to exclaim, "Oh, these stupid, stupid boys!" As if a physician should exclaim, "Oh, these horrid patients, they won't get well!" But suppose, by some extraordinary conjunction of the planets, a really good teacher of reasoning were to be appointed, what would be his first care? It would be to guard his scholars from that malady with which logic is usually infested, so that unless it runs off them like water from a duck, it is sure to make them the very worst of reasoners, namely, unfair reasoners, and what is worse unconsciously unfair, for the rest of their lives. The good teacher will therefore take the utmost pains to prevent the scholars

getting puffed up with their logical acquirements. He will wish to impregnate them with the right way of looking at reasoning before they shall be aware that they have learned anything, and he will not mind giving considerable time to that, for it is worth a great deal. But now come the examiner and the pupil himself. They want *results*, tangible to them. The teacher is dismissed as a failure, or, if he is allowed another chance, he will take good care to reverse the method of his teaching and give them *results* — especially, as that is the lazy way. These are some of the causes of there being so few strong reasoners in the world. But allowing for the influence of such causes as well as we can, the fact still remains that comparatively few persons are originally possessed of any but the feeblest modicum of this talent. What is the significance of that? Is it not a plain sign that the faculty of reasoning is not of the first importance to success in life? For were it so, its absence would cause the individual to postpone marriage and so affect his procreation, and thus natural selection would operate to breed the race for vigorous reasoning powers, and they would become common. And the study of characters confirms this conclusion. For though the men who are most extraordinarily successful evidently do reason deeply about the details of their business, yet no ordinary degrees of good success are influenced — otherwise than perhaps favorably — by any lack of great reasoning power. We all know highly successful men, lawyers, editors, scientific men — not to speak of artists — whose great deficiency in this regard is only revealed by some unforeseen accident.

658. The other observation I desired to make about the human reason is that we find people mostly modest enough about qualities which really go to making fine men and women — the courageous man not usually vaunting his courage, nor the modest woman boasting of her modesty, nor the loyal vain of their good faith. the things they are vain about are some insignificant gifts of beauty, or skill of some kind. But beyond all, with the exception of those who, being trained in logic, follow its rules and thus do not trust their direct reasoning powers at all, everybody else ridiculously overrates his own logic, and if he really has superior powers of reason is usually so consumed by conceit that it is far from rare to see a young

man completely ruined by it; so that one is sometimes tempted to think, and perhaps truly, that it conduces not only to a man's success from a worldly point of view but to his attaining any real elevation of character to be all but a fool in this regard, provided only he be perfectly aware of his own deficiency. . . .

659. All those modern books which offer new philosophies of religion, at the rate of one every fortnight on the average, are but symptoms of the temporary dissolution of the Christian faith. This appears as soon as we compare them with the works of religious philosophy of the ages of faith, such as the *Summa* of St. Thomas Aquinas or the *Opus Oxoniense* of Duns Scotus — the one reproducing without a shadow of mistrust every dogma of the Fathers of the Church, while the other displays a far stouter faith in maintaining that metaphysics has nothing to say either one way or the other concerning any question of religion, but leaves it to be decided by positive testimony or inspiration. The only old book which these modern philosophies of religion really resemble a good deal — except that they lack its terrible earnestness — is the *De consolatione philosophiae* and it is paying them a high compliment to say so. Boethius, you know, is utterly religionless, but he feels the need of religion and vainly tries to find a substitute for it in philosophy. His first two books are somewhat inspiring, because they breathe an unconscious religion. But as the work progresses, reasoning enters more and more into the thought, until the last book, which resembles a modern essay much more than all the rest, is a mere diet of bran for the hungered soul.

660 It is hardly necessary to insist here that the highly cultured classes of Christendom — excepting always those families which are so important as to be an object of solicitude on the part of the priests — are nowadays nearly destitute of any religion. It was made perfectly manifest five and twenty years ago or more — no matter for the exact date, it was at a date when men saturated with the mechanical philosophy were still hesitating to separate themselves from the church — when John Tyndall, in the innocence of his scientific heart, proposed to measure the efficacy of prayer by experimental statistics. Instantly, the clergy, one and all, instead of meeting the proposal with the candor with which Elijah met the priests of Baal — though by the way I notice some ingenious persons

think his barrels of water were really deodorized kerosene, which for a student of the history of chemistry, would, of itself, seem to be a good enough miracle — instead of thanking Tyndall for the idea, I say, the clergy to a man shrank back in terror, thus conclusively betraying to every eye their own utter disbelief in their own dogma. They pronounced it an impious proposition. But there was nothing more impious in it than in any other sort of inquiry into religion except this — that they feared it would bring all “talkee-talkee” to an end. Although it must be granted that in our country the clergy are by far the most sceptical class of the community, yet where the clergy stood a generation back, the bulk of the highly educated and cultured class stands now.

It is a thousand times better to have no faith at all in God or virtue than to have a hemi-hypocritical faith . .

§3. VITALLY IMPORTANT TRUTHS

661 Conservatism, true conservatism, which is sentimental conservatism, and by those who have no powers of observation to see what sort of men conservatives are, is often called stupid conservatism, an epithet far more applicable to the false conservatism that looks to see on which side bread is buttered — true conservatism, I say, means not trusting to reasonings about questions of vital importance but rather to hereditary instincts and traditional sentiments. Place before the conservative arguments to which he can find no adequate reply and which go, let us say, to demonstrate that wisdom and virtue call upon him to offer to marry his own sister, and though he be unable to answer the arguments, he will not act upon their conclusion, because he believes that tradition and the feelings that tradition and custom have developed in him are safer guides than his own feeble ratiocination. Thus, true conservatism is sentimentalism. Of course, sentiment lays no claim to infallibility, in the sense of *theoretical infallibility*, a phrase that logical analysis proves to be a mere jingle of words with a jangle of contradictory meanings. The conservative need not forget that he might have been born a Brahmin with a traditional sentiment in favor of *suttee* — a reflection that tempts him to become a radical. But still, on the whole,

he thinks his wisest plan is to reverence his deepest sentiments as his highest and ultimate authority, which is regarding them as *for him practically infallible* — that is, to say infallible in the only sense of the word in which *infallible* has any consistent meaning.

662. The opinion prevalent among radicals that conservatives, and sentimentalists generally, are fools is only a cropping-out of the tendency of men to conceited exaggeration of their reasoning powers. Uncompromising radical though I be upon some questions, inhabiting all my life an atmosphere of science, and not reckoned as particularly credulous, I must confess that the conservative sentimentalism I have defined recommends itself to my mind as eminently sane and wholesome. Commendable as it undoubtedly is to reason out matters of detail, yet to allow mere reasonings and reason's self-conceit to overslaw [over-slaugh? over-awe?] the normal and manly sentimentalism which ought to lie at the cornerstone of all our conduct seems to me to be foolish and despicable.

663. Philosophy after all is, at its highest valuation, nothing more than a branch of science, and as such is not a matter of vital importance, and those who represent it as being so are simply offering us a stone when we ask for bread. Mind, I do not deny that a philosophical or other scientific error may be fraught with disastrous consequences for the whole people. It might conceivably bring about the extirpation of the human race. Importance in that sense it might have in any degree. Nevertheless, in no case is it of *vital* importance.

664. A great calamity the error may be, *qua* event, in the sense in which an earthquake, or the impact of a comet, or the extinction of the sun would be an important event, and consequently, if it happens to lie in the line of my duty or of yours to investigate any philosophical question and to publish the more or less erroneous results of our investigations, I hope we shall not fail to do so, if we can. Certainly, any task which lies before us to be done has its importance. But there our responsibility ends. Nor is it the philosophy itself, *qua* cognition, that is vital, so much as it is our playing the part that is allotted to us.

665. You will observe that I have not said a single word in disparagement of the philosophy of religion, in general, which

seems to me a most interesting study, at any rate, and possibly likely to lead to some useful result. Nor have I attacked any sect of that philosophy. It is not the philosophy which I hold to be baleful, but the representing it to be of vital importance, as if any genuine religion could come from the head instead of from the heart.

666 Somewhat allied to the philosophy of religion is the science of ethics. It is equally useless. Now books of casuistry, indeed, using the word "casuistry" not in any technical sense, but merely to signify discussions of what ought to be done in various difficult situations, might be made at once extremely entertaining and positively useful. But casuistry is just what the ordinary treatises upon ethics do not touch, at least not seriously. They chiefly occupy themselves with reasoning out the basis of morality and other questions secondary to that. Now what's the *use* of prying into the philosophical basis of morality? We all know what morality is: it is behaving as you were brought up to behave, that is, to think you ought to be punished for not behaving. But to believe in thinking as you have been brought up to think defines *conservatism*. It needs no reasoning to perceive that morality is conservatism. But conservatism again means, as you will surely agree, not trusting to one's reasoning powers. To be a moral man is to obey the traditional maxims of your community without hesitation or discussion. Hence, ethics, which is reasoning out an explanation of morality is — I will not say immoral, [for] that would be going too far — composed of the very substance of immorality. If you ever happen to be thrown in with an unprofessional thief, the only very bad kind of thief, so as to be able to study his psychological peculiarities, you will find that two things characterize him, first, an even more immense conceit in his own reasoning powers than is common, and second, a disposition to reason about the basis of morals.

667. Ethics, then, even if not a positively dangerous study, as it sometimes proves, is as useless a science as can be conceived. But it must be said, in favor of ethical writers, that they are commonly free from the nauseating custom of boasting of the utility of their science.

668. Far be it from me to decry. Though I do hail from

New York.* I shall hardly be mistaken for a Wall Street Philistine. A useless inquiry, provided it is a systematic one, is pretty much the same thing as a scientific inquiry. Or at any rate if a scientific inquiry becomes by any mischance useful, that aspect of it has to be kept sedulously out of sight during the investigation or else, as I shall try to show you another evening, its hopes of success are fatally cursed.

669 As long as ethics is recognized as not being a matter of vital importance or in any way touching the student's conscience, it is, to a normal and healthy mind, a civilizing and valuable study — somewhat more so than the theory of whist, much more so than the question of the landing of Columbus, which things are insignificant not at all because they are useless, nor even because they are little in themselves, but simply and solely because they are detached from the great continuum of ideas

670 It would be useless to enumerate the other sciences, since it would only be to reiterate the same declaration. As long as they are not looked at as practical, and so degraded to pot-boiling arts — as our modern writers degrade the philosophy of religion, in claiming that it is practical — for what difference does it make whether the pot to be boiled is today's or the hereafter's? They are all such that it would be far too little to say that they are valuable to us. Rather let our hearts murmur "blessed are we" if the immolation of our being can weld together the smallest part of the great cosmos of ideas to which the sciences belong.

671. Even if a science be useful — like engineering or surgery — yet if it is useful only in an insignificant degree as those sciences are, it still has a divine spark in which its petty practicality must be forgotten and forgiven. But as soon as a proposition becomes vitally important — then in the first place, it is sunk to the condition of a mere utensil; and in the second place, it ceases altogether to be scientific, because concerning matters of vital importance reasoning is at once an impertinence toward its subject matter and a treason against itself.

* Peirce was born in Cambridge, Mass., September 10, 1839, and lived there and in Milford, Pa., most of his life. For a time, however, he gave private instruction in logic at New York.

672. Were I willing to make a single exception to the principle I thus enunciate, and to admit that there was one study which was at once scientific and yet vitally important, I should make that exception in favor of logic, for the reason that if we fall into the error of believing that vitally important questions are to be decided by reasoning, the only hope of salvation lies in formal logic, which demonstrates in the clearest manner that reasoning itself testifies to its own ultimate subordination to sentiment. It is like a Pope who should declare *ex cathedra* and call upon all the faithful to implicitly believe on pain of damnation by the power of the keys that he was *not* the supreme authority.

673. Among vitally important truths there is one which I verily believe — and which men of infinitely deeper insight than mine have believed — to be solely supremely important. It is that vitally important facts are of all truths the veriest trifles. For the only vitally important matter is *my* concern, business, and duty — or yours. Now you and I — what are we? Mere cells of the social organism. Our deepest sentiment pronounces the verdict of our own insignificance. Psychological analysis shows that there is nothing which distinguishes my personal identity except my faults and my limitations — or if you please, my blind will, which it is my highest endeavor to annihilate. Not in the contemplation of “topics of vital importance” but in those universal things with which philosophy deals, the factors of the universe, is man to find his highest occupation. To pursue “topics of vital importance” as the first and best can lead only to one or other of two terminations — either on the one hand what is called, I hope not justly, Americanism, the worship of business, the life in which the fertilizing stream of genial sentiment dries up or shrinks to a rill of comic tit-bits, or else on the other hand, to monasticism, sleepwalking in this world with no eye nor heart except for the other. Take for the lantern of your footsteps the cold light of reason and regard your business, your duty, as the highest thing, and you can only rest in one of those goals or the other. But suppose you embrace, on the contrary, a conservative sentimentalism, modestly rate your own reasoning powers at the very mediocre price they would fetch if put up at auction, and then what do you come to? Why, *then*, the very

first command that is laid upon you, your quite highest business and duty, becomes, as everybody knows, to recognize a higher business than your business, *not* merely an avocation after the daily task of your vocation is performed, but a generalized conception of duty which completes your personality by melting it into the neighboring parts of the universal cosmos. If this sounds unintelligible, just take for comparison the first good mother of a family that meets your eye, and ask whether she is not a sentimentalist, whether you would wish her to be otherwise, and lastly whether you can find a better formula in which to outline the universal features of her portrait than that I have just given. I dare say you can improve upon that; but you will find one element of it is correct — especially if your understanding is aided by the logic of relatives — and that is that the supreme commandment of the Buddhichristian religion is, to generalize, to complete the whole system even until continuity results and the distinct individuals weld together. Thus it is, that while reasoning and the science of reasoning strenuously proclaim the subordination of reasoning to sentiment, the very supreme commandment of sentiment is that man should generalize, or what the logic of relatives shows to be the same thing, should become welded into the universal continuum, which is what true reasoning consists in. But this does not reinstate reasoning, for this generalization should come about, not merely in man's cognitions, which are but the superficial film of his being, but objectively in the deepest emotional springs of his life. In fulfilling this command, man prepares himself for transmutation into a new form of life, the joyful Nirvana in which the discontinuities of his will shall have all but disappeared.

674. Do you know what it was that was at the root of the barbarism of the Plantagenet period and paralyzed the awakening of science from the days of Roger Bacon to those of Francis Bacon? We plainly trace it in the history, the writings, the monuments, of that age. It was the exaggerated interest men took in matters of vital importance

675. Do you know what it is in Christianity that when recognized makes our religion an agent of reform and progress? It is its marking duty at its proper finite figure. Not that it diminishes in any degree its vital importance, but that behind

the outline of that huge mountain it enables us to descry a silvery peak rising into the calm air of eternity.

676 The generalization of sentiment can take place on different sides. Poetry is one sort of generalization of sentiment, and in so far is the regenerative metamorphosis of sentiment. But poetry remains on one side ungeneralized, and to that is due its emptiness. The complete generalization, the complete regeneration of sentiment is religion, which is poetry, but poetry completed.

677. That is about what I had to say to you about topics - of vital importance. To sum it up, all sensible talk about vitally important topics must be commonplace, all reasoning about them unsound, and all study of them narrow and sordid.

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